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Rock Products

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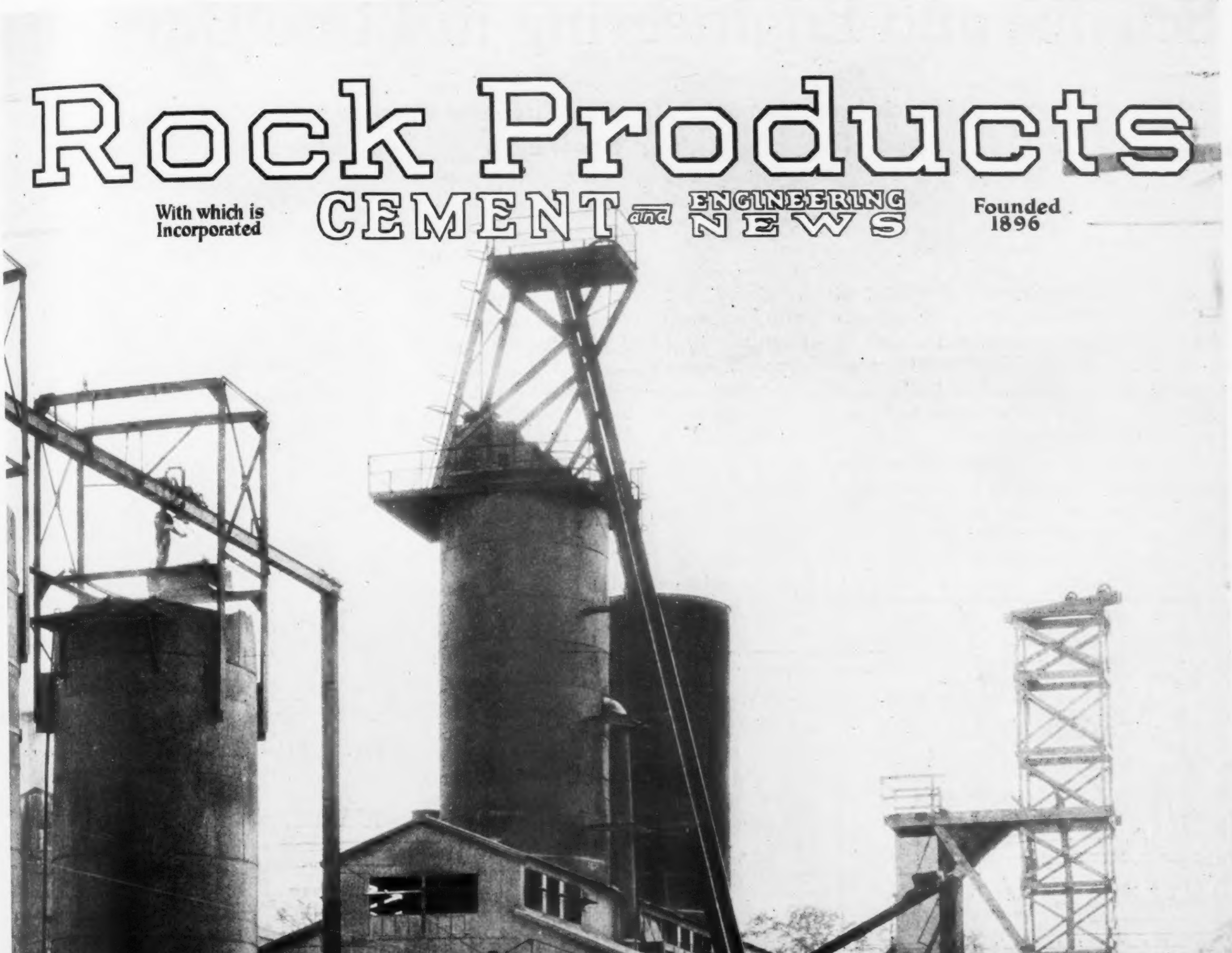


Two new gas-fired lime kilns at the Peerless White Lime Co., Ste. Genevieve, Mo. (Description on pages 54-58)

Science and Engineering in Lime Burning*

Much Improvement in Ordinary Practice Possible from Application of Existing Knowledge and Experience

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

LIME is a most interesting substance, but this fact due to a great superficial familiarity with lime on the part of many of us is not appreciated and in consequence abused. Limestone lends itself readily—too readily—to conversion into lime, therefore the most crude methods can and are used in burning, or in lime manufacture. Limestone, to most, is a common rock and hardly worthy of careful study. What actual reactions take place during the burning periods are

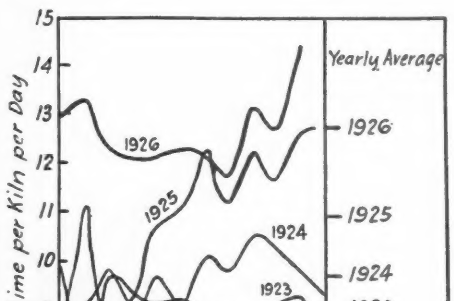


Fig. 1. Kiln capacity per day

known to extremely few; what methods to use to regulate these reactions are known to even a lesser number.

There are very good opportunities for improvement and a few manufacturers are making very serious efforts to manufacture a product having desirable characteristics, but many will never do so until they are forced into it by competition; and of those who make attempts none will succeed except they call science and sound engineering to their aid.

Sometimes apparently serious attempts are made at improving the product, at increasing the output or bettering the efficiency, but often in such cases men are put in charge, who either are not in sympathy with the experiments or lack the necessary knowledge, or probably may be saturated with faulty ideas prevailing in every industry of long standing, of which the lime industry appears to have more than its quota. Efforts are half-hearted, and if there are no immediate results, attempts at improvement are abandoned, and to the ignorant science again becomes discredited bunk. It is a sad commentary that a large number of lime manufacturers in this country still employ the same crude uneconomical methods that were used as far back as the memory of the oldest lime burner reaches. The lime industry as a whole has not made anywhere near the same progress in the past 25 years that many other industries have. In part, this is excusable and in part not. The industry is relatively small, and the gains to be derived not very plainly apparent to many. Some producers make strenuous efforts at improvements, but with only a few such workers experience accumulates slowly. Industrial progress is accumulated experience and knowledge of many.

Example of Ordinary Possible Improvement in Plant Efficiency

That improvement is possible, but that it may be slow in coming and that persistence is necessary, is demonstrated by the graphs of operating results shown in Figs. 1 and 2. They give results obtained by a plant operating for the entire period, year in and year out, four kilns. All improvements were of a minor nature; no great kiln changes. In three years of

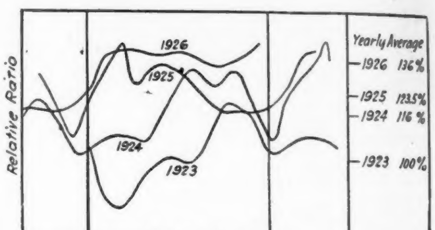


Fig. 2. Relative fuel ratio. Four years—superimposed

effort, lime output per ton of coal was increased 36%, and capacity of kiln 41%. The views, Figs. 3 and 4, show progress in a different direction. Fig. 3 shows how the kilns smoked before attempts at improvement were started. Everyone will agree that lime of good appearance cannot be obtained from kilns smoking as badly as those. What is more, good lime of consistent characteristics also cannot be obtained. Fig. 4 shows the appearance of the kilns after improved methods were adopted.

Structure of Limestone

All lime and limestone is crystalline. It may present an amorphous appearance; it may not even give any crystalline characteristics when highly magnified by

*Paper read at Lime Symposium, American Chemical Society, Richmond, Va., April, 1927, *Industrial and Engineering Chemistry* for May.

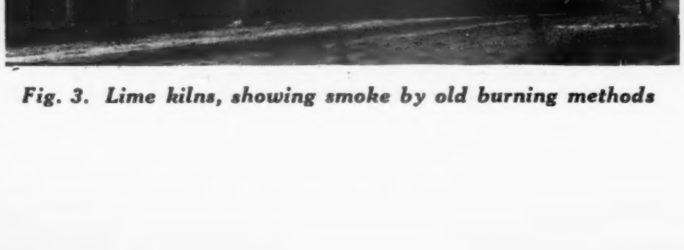


Fig. 3. Lime kilns, showing smoke by old burning methods

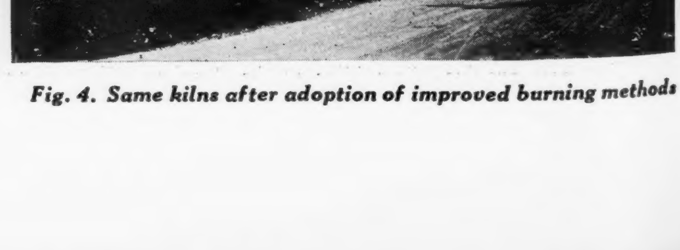
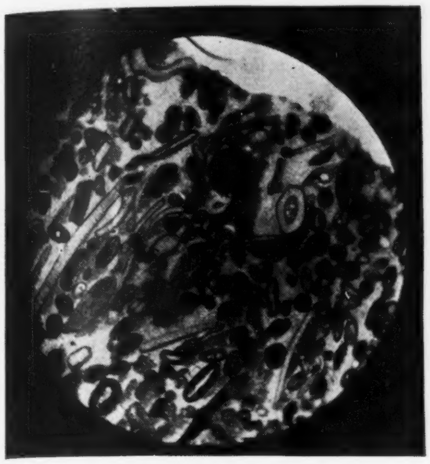


Fig. 4. Same kilns after adoption of improved burning methods

the petrographic microscope, but still, in its ultimate form, it is crystalline, the mass being composed of cells having a definite arrangement and of definite size.

The atoms making up the molecules of lime or limestone are aggregated in a systematic manner so as to form unit cells. These cells are the smallest particles of lime or limestone that can exist. Fig. 5 shows calcium carbonate ($CaCO_3$) and calcium oxide (CaO) unit cells drawn to scale magnified four quadrillion times. That the cells have this form and that they are of this size can be proven with great accuracy by the employment of the x-ray defraction apparatus, a new tool of great promise for the scientific student of lime.



Photomicrograph of granular Ste. Genevieve oolite (magnified 10 diameters)

A unit cell of limestone is not very large, the edge dimension as shown being 6.36 Angstrom units. This unit is the inch of the physicist, dealing with substance submicroscopic in size and there are a little over 250,000,000 of these units to an inch. Therefore the number of these unit cells of limestone lined up shoulder to shoulder in a distance of 1 in. is 39,300,000. These cells are so extremely minute that those contained in only a cubic inch of limestone placed one up against the other in a line would reach around the world about 1,000,000 times. Still it is the arrangement of these indefinitely small cells that determine the properties of lime.

It is well known that the chemical analysis of lime does not always indicate the special purposes that the lime may be good for. There are many lime properties, and important properties at that, having no relation to chemical analysis. In many instances, it is entirely the physical and not the chemical makeup that determines the behavior of a substance. The chemical analysis will tell us that there are brick-unit cells but how these cells are arranged, what system of architecture is followed is a different story altogether. Taking plasticity as an example that one lime is plastic and the other is not is more a matter of arrangement of these unit cells than what kind of cells they are.

Changes in Structure During Burning

During the burning of limestone there are numerous changes that occur in the physical structure, as to exactly what happens we, in a way, can deduce from the makeup of original and final products. There is no doubt, however, that there are also changes which at the present we do not as yet suspect. Those that we have a fair assurance do take place are:

(1) The heat causes so great a molecular activity that the CO_3 ion is broken up, the CO_2 molecule escaping, the remaining O-atom entering the CaO structure.

(2) The cell shape changes from rhombohedral for $CaCO_3$ to cubic for CaO.

(3) The old cell arrangement is entirely destroyed and new cells are formed. Each $CaCO_3$ cell contains two complete molecules, while each CaO cell contains four molecules.

(4) The dimensions of the old cell were 6.36 Angstrom units, while the dimensions of the CaO cell are only 4.79A°.

(5) The number of new cells is exactly half the number of the old $CaCO_3$ cells.

(6) The new cell is considerably heavier than the old cell. This, however, will not be apparent in soft-burned lime due to the formation of extremely minute invisible voids.

(7) When lime is very hard burned, the unit cells of the CaO will not change in size or shape. They will, however, aggregate, the voids will fill out, the lump will shrink and become perceptibly heavier.

(8) Occupied space, that is space under atomic influence in calcium oxide is 43.4% of that in calcium carbonate. In other words, soft burned unshrunk lime contains 56.6% voids. This is more than the loss of weight due to burning; in fact, the loss of weight has little to do with it.

(9) While specific gravity of $CaCO_3$ is 2.71, the apparent gravity of soft burned lime is only 1.5. If this lime is extremely hard burned, the cells will assemble up against one another. There will be no voids. The specimen will shrink to less than half the original size and the specific gravity will increase up to the maximum or 3.4.

(9A) The CaO cell is quite self-contained, not dependent so much upon neighbor cells which accounts for the slight change when lime is softly burned.

(10) The spaces between the cells in soft burned lime are wider than the width of the cells. They are several times wider than the molecule of water, also considerably wider than the molecule of CO_2. As the lime is hard burned, the space width is reduced and water molecules enter with greater and greater difficulty.

(11) During hydration the CaO cells break down in four times the number of $Ca(OH)_2$ cells.

(12) The dimension of a $Ca(OH)_2$ cell is 3.52A° as compared with 4.79A° for CaO. The four cells, however, occupy a great deal more space than the original CaO cell.

(13) If the carbonate was soft burned oxide, while hydrating there will be found spaces already existing for the hydrate to expand into.

(14) If the lime was hard burned, the spaces are reduced in size at points, or entirely eliminated at other points. The hydrate will have greater difficulty in expanding, and as a consequence there will be either localized or general closer packing of the cells, which tends to give the lime different physical properties.

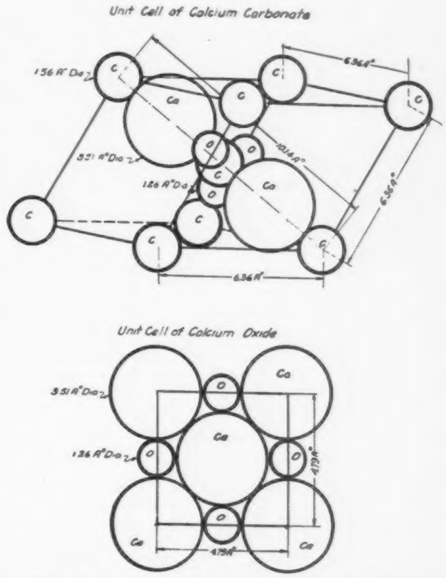


Fig. 5. Unit cell arrangements of lime and limestone

(15) The above is all independent of the action that impurities in limestone and fuel may have on the properties and characteristics of lime and hydrate.

Haslam in his studies of lime comes to the conclusion that "The temperature at which a limestone is burned has an important bearing upon the properties of the resultant hydrates. Time of burning is of equal or greater importance."

Mathers of Indiana University says: "The temperature at which quicklime is produced largely determines the hydrating properties of lime and the rate of hydration, in turn, seems to have an important influence upon properties of hydrates."

Shrinkage of Lime Overburned

Fig. 6 gives some results of the writer's experiments on the effect of heat on some properties of lime. It is plainly noticeable that both time and temperature play important roles. At least, to the writer's mind, there is little doubt that lime made at high temperatures, while not fused, is soft. This softness means that the cells

flow, that atoms are able to capitalize upon their attraction for each other, that there is a general molecular activity tending to make the cells aggregate into larger and larger, denser and denser groups. In plain words one would say the lime "shrinks." Fig. 7 shows this shrinkage plainly. Sample *A* is a 1-in. cube of limestone; *B* is softly burned lime.

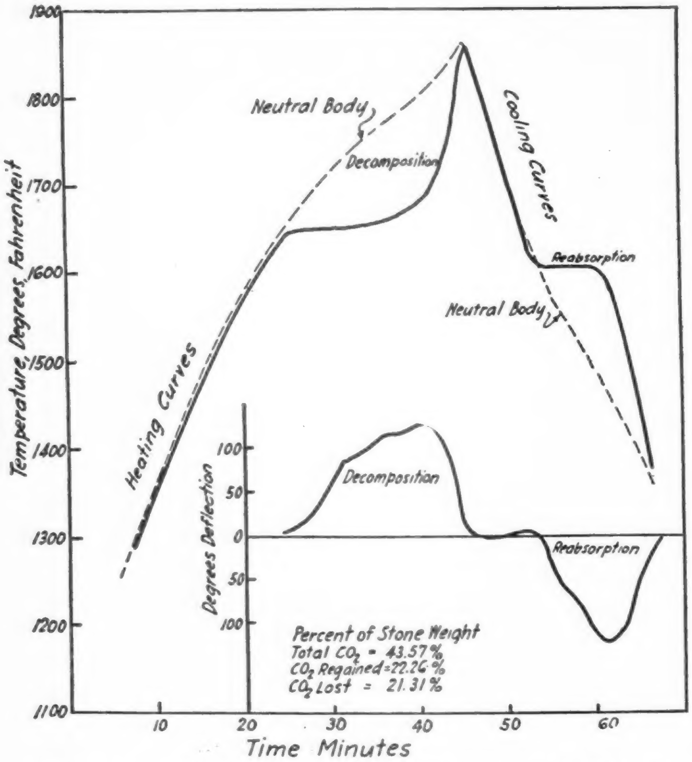


Fig. 8. Ste. Genevieve high-calcium limestone (solid) in 100% carbon dioxide atmosphere

As limestone it had the same size as *A*, and as lime it lost practically no volume. The example *C* as limestone had also the same size as *A*, but having been burned for a long time and at a high temperature, it is 40% smaller than it was as limestone.

Actual Time and Temperatures Used in Practice

The writer in his studies of lime kilns found temperatures as high as 3000 deg. F., and 2600 deg. F. is quite common. Flame temperatures of 2000 deg. F. which both Haslam and Mathers seem to prefer are not obtained in any except the wood-fired kilns; and there, this is due to the diluting effect of the great quantities of water vapor coming from the wood.

As regards time of burning, the lime usually stays in the ordinary kiln more than two days, and in some cases up to seven days. The length of time it is in the burning zone may be about one-third to one-half of this time. By the time it gets into the hottest zone where the temperature is 2400 to 2600 deg. F. it is all lime and then it remains there for anywhereas from two to eight hours. Some few kilns are drawn every two, and some every eight, hours; but the majority either every four or six hours.

Then there is the question of non-uniformity. Almost all vertical-kiln stone may vary in size from 4 in. to 12 in. One lump will have 9 sq. in. of surface, the other 864 sq. in. One will contain 64 cu. in., the other 1728. The large stone will require 27 times the heat of the small one, but will have only nine times the surface. Then to burn the core in the large lump, the heat will have to pass through 6 in. of insulating lime, while in the small piece only through 2 in. Thus, of course, it is impossible for the large lump to have the same properties after burning as has the small one; even though different portions of the large lump are bound to have different characteristics, having been burned at different temperatures for different times.

Variable Factors in Kiln Temperatures

Then there is the flame temperature variability. The lump of lime that passes down through the center of the kiln shaft will not be nearly as hard burned as the lump that passes the furnace eye. The gas flow also is unequal. There is stronger flow upwards in certain channels than in others. Where flow is strongest limestone begins to decompose much higher in the kiln. If the drawing were exactly proportional to the lime made in different kiln sections, then this last variability would not count; but as it is the tendency is to draw most lime where least is made. It is hard to get the lime down from the kiln shaft corners and

A B C

Fig. 7. Limestone cubes before and after burning

sides without having the underburned center fall.

There is also variability in firing. The fact that it averages itself out over the period between two draws does not fully correct the damage.

Contamination of Lime from Fuel

There is still another possibility of harmful effect on the lime quality, that is, by contamination. That lime in kilns could breathe, inhale as well as exhale would appear quite puzzling to many; but nevertheless this is easily possible and very often responsible for poor lime quality. Ordinarily, the lime exhales, the CO_2 gas given off by the decomposing carbonate exhudes outward through the surface. This is demonstrated by the lag in the heating curve of Fig. 8. If, for any reason, the temperature drops below that necessary for decomposition, the CO_2 within the lump will be reabsorbed, that is, it will return into the lime to again form carbonate. This also is demonstrated by Fig. 8 in the lag of the cooling curve. When this happens a vacuum occurs in the lump and to satisfy it gas from the outside of the lump will rush in; and if

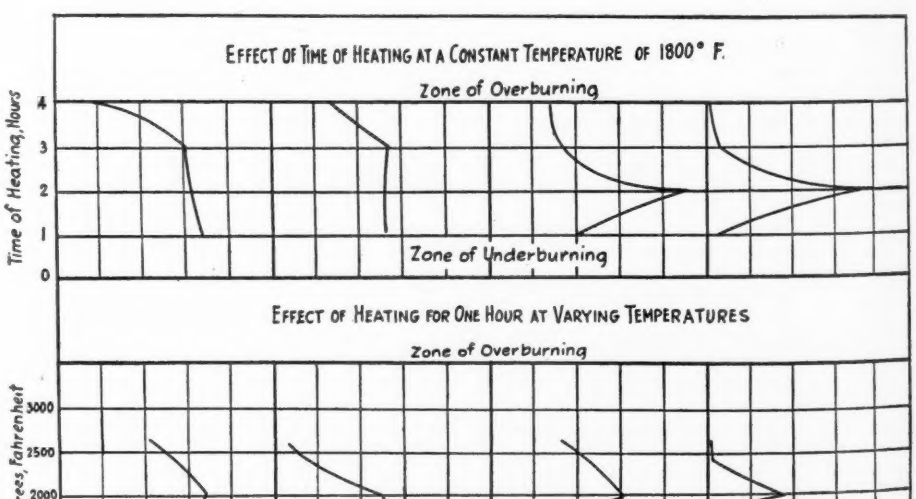


Fig. 6. Effect of heat on properties of high-calcium limestone

this gas contains impurities, whatever they may be, tar vapors, fine particles of smoke, sulphur dioxide, arsenic compounds, they, to a degree, will be absorbed or just deposited, contaminating the lime often to such an extent as to prevent its use for special purposes.

Necessary Steps in Control of Lime Burning

It now becomes evident that the ordinary lime kilns, as ordinarily operated, cannot give a lime that is satisfactory in a great many respects. It is impossible to get low temperatures except at the expense of efficiency, if resort is not taken to special and only lately recommended methods of operation. Fig. 9 is a diagrammatic sketch showing roughly what is needed if control over temperatures in a lime kiln is to be exercised.

(1) It is essential that stone fed to the kiln is fairly uniform in size and it is to be preferred to be as small as is permissible from practical operating standpoints.

(2) The producer gas and air must be supplied to the kiln at a definite rate. Both must be constant. Any variation will result in temperature fluctuations as well as in the lowering of kiln efficiency.

(3) The gas and the air should be thoroughly mixed before they enter the kiln, otherwise there will be stratification into streams of variable oxygen content. This will in turn result in variable temperatures through the kiln and will also lower kiln capacity.

(4) The kiln must be operated at a definite rate proportional to the shaft cross-section, otherwise there will be gas streams of unequal velocity, resulting in lime being burned higher in certain sections of the kiln than in others.

(5) It is preferable to have gas and air under slight pressure and the kiln eye choked down, to assure fair velocity of gases when entering kiln and their penetration to the kiln center.

(6) The kiln must be so arranged by means of properly located piers and punching doors that when drawing the kiln can be properly punched and more lime removed from above the eyes and corners than from the center.

(7) The drawing should be frequent, preferably every two hours, and the same amount of lime should be drawn during each draw. This is entirely possible if the gas and air are supplied to the kilns at constant rates.

(8) Hand-firing is too inconstant even to be considered. Probably the best system of firing is a gas producer of such type that the volatile matter will be driven off at a slow steady rate. Low gasification per square foot of grate surface is essential excepting only when automatic producers are used.

(9) While drawing there should be no interruption in firing. Any cooling resulting from interruption may cause recarbonization and possible contamination.

(10) Kiln temperatures should be controlled by dilution with waste gases. If cold kiln gas is employed, this gas will have to be reheated, causing a waste of heat in reheating it to kiln temperature.

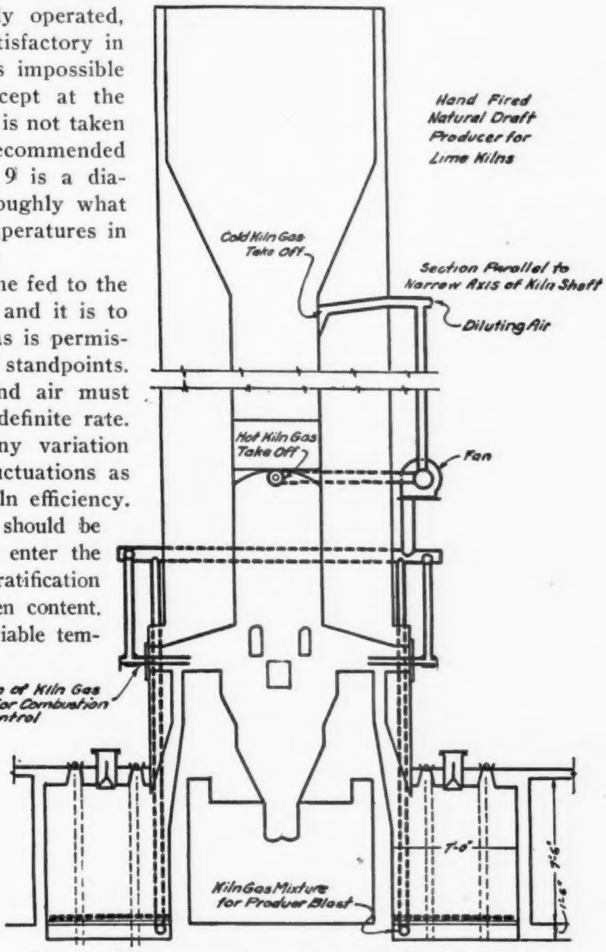


Fig. 9. Diagrammatic outline of kiln showing means by which temperature control may be exercised

(11) The preferable location for removal of waste gas is immediately above the decomposition zone, where the gas is still hot. If hot gas is recirculated, a very large amount may be used, thus very effectively reducing kiln temperatures.

(12) The blower or fan circulating the gas should be so arranged that it handles both air and recirculation gas mixed, thus lowering its temperature.

(13) When desiring to hard burn the lime, the recirculating gas amount would be reduced, increasing kiln temperatures. It also could be accomplished by drawing at a rate permitting the lime to remain longer in the kiln or both systems may be employed.

(14) When temperatures would be lowered for soft burning of lime, the decomposition zone would extend to greater heights, due to the lowering of temperature difference between the two zones.

(15) If care is taken that the above essentials are satisfied, and if the kiln is so operated that high CO_2, low O and no CO is found in the waste gas; and if it is guarded against loss of heat by radiation, then the kiln capacity and efficiency as well as lime quality will be good.

Pulverized Rock Fertilizer Proposition in Texas

EARLY in May the first car of natural fertilizer, totaling 60,000 lb., was shipped from the plant of the American Fertilizer and Chemical Works, San Saba, Texas, to William Hirth at Columbia, Mo. The material will be used under the direction of Professor Miller, chief of the soil bureau of the Missouri University. It is said that in the mine that has been opened up by the company nature has compounded an almost perfect fertilizer product, and the rock when crushed will contain the proper proportion of potash, nitrogen, phosphate, carbon, calcium and other elements essential to plant life.

The plant site, three miles east of here, is very active. Thomas F. Hawkins, president of the company, has returned after placing orders for the necessary machinery with the following firms: Williams Patent Crusher and Pulverizer Co., St. Louis, Mo.; Sullivan Machinery Co., Chicago, Ill., and Triumph Electric Co., Cincinnati, Ohio. A contract has been signed with the Texas Power and Light Co., Dallas, for electric power. The company's lines now run through the tract. The Santa Fe railway will build a spur.

Judge Hawkins recently stated:

What is needed is a good as well as cheap fertilizer which can be delivered to the American farmer at about half the present price he must pay. Nitrate of soda from South America and potash from Europe seem to be considered as two of the essentials of the fertilizer and so long as we import this material this condition of high prices for low value fertilizer will exist.

Our production cost will be very low because no deep drilling or excavation work is needed. What we have is a crusher job. Our work consists only in mining, pulverizing, grinding and sacking the material and it is ready to be applied to the soil.

The company was recently organized with a capital of $250,000, with headquarters at Georgetown, Texas. The launching of the new enterprise is the culmination of efforts extending over a period of more than 25 years by J. H. Foster, secretary of the company. The following are officers: Thomas F. Hawkins, president; B. H. Ashby, J. R. Zimmerman and Dr. J. H. Thompson, vice-presidents; W. E. Brown, treasurer, and J. H. Foster, secretary. The directors include Thomas F. Hawkins, W. E. Brown, Dr. J. H. Thompson, B. H. Ashby, W. D. Jenkins, J. H. Foster, R. H. Parks, L. H. Lacy, Lowery Foster.—*Manufacturers' Record.*

New Gas Kilns of the Peerless White Lime Co., Ste. Genevieve, Mo.

A Kiln of Unusual Size, Embodying Special Features of Design, Which Makes Lime of Exceptional Quality, with Efficiency

ONE lime plant in this country, where Victor J. Azbe, the well-known consulting combustion engineer, of St. Louis, Mo., has had a full opportunity to try out some of his theories in regard to increasing the efficiency of lime manufacture, is that of the Peerless White Lime Co., Ste. Genevieve, Mo. This progressive company was among the first to employ underground mining methods for the winning of its raw material, and has been a leader in other ways in the introduction of efficiency in lime manufacture.

The description of the mining operation is a separate story, and will be told in detail in a later issue of Rock Products by Ralph W. Smith, mining engineer of the company. Briefly a special room and pillar method is employed.

Part of the mine entrance, Peerless White Lime Co., Ste. Genevieve, Mo.

Practice, however, differs somewhat from standard limestone mining practice elsewhere. The limestone lies in practically horizontal strata and mining has permitted the selection of stone of a remarkably uniform character, as well as an all-the-year-round operation. This is especialy important in the production of high grade chemical lime, but for other purposes, such as construction lime, the stone may be quarried.

The Original Kilns

The original lime plant of the Peerless White Lime Co. has been described in previous issues of Rock Products, and is, indeed, one of the best known lime plants in the United States. The quality of the limestone and lime is of such purity that for some chemical purposes it has never been surpassed. Consequently the products of the plant—a very finely pulverized limestone, lime and hydrate have a practically nation wide distribution.

The older kilns, of which there are eight, have a shaft dimension of 5 by 10 ft. and are 51 ft. 9 in. high above the draw gates. These kilns are fired either by individual gas producers or by gas obtained from the large R. D. Wood automatic gas producer. The output of these kilns varies between 18.5 and 22 tons each. There is also one hand-fired kiln, but this one is now being reconstructed to conform with a type having all known features incorporated for obtaining uniformly burned lime, hard or soft. Special provisions are made to assure regular and uniform temperatures and to permit correct drawing of lime. The firing will be with gas; the flame will be tempered.

All of the old kilns have open tops and natural draft. They are charged by hoisting the boxes from the mine cars and dumping them by tilting, which the hoistman accomplishes by the simple method of bringing one side of the box to rest against a properly located beam. While this method has a drawback due to the necessity of hooking and unhooking the boxes, it also has advantages in a high possible capacity.

These old kilns, as well as the new kilns, are trimmed through poke holes located in the ends of the kiln shafts, which permit this

Two general views of the two new kilns of the Peerless White Lime Co., Ste. Genevieve, Mo.

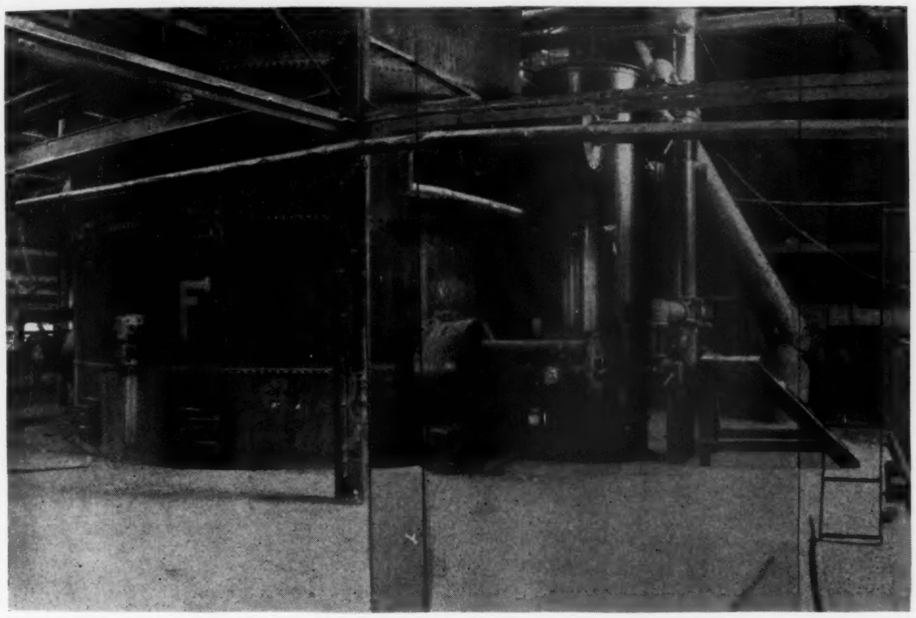
operation to be done without any interference with the firing, excepting occasional slight checking of the fires. Under such conditions of drawing, the capacity attained is naturally higher. In many plants from one to two hours are wasted of every draw period because of the burning down of fires, drawing and extended punching.

Portion of the limestone deposit stripped clean by hydraulic methods, which will be operated for the production of stone for certain kinds of lime

The New Kilns

The new kilns (one is under construction) have a comfortable daily output of 50 tons each, of high calcium lime. More than this has been obtained, but a greater output is discouraged.

The shaft dimensions are 6 by 12 ft. and the kiln height above the draw gates is 78 ft. The cooler depth is quite generous, being 17.5 ft., which is found very desirable. The burning zone height is 32.8 ft., equipped with eight firing eyes on two different firing levels. The total internal kiln space is 7520 cu. ft. divided as follows: Cooler 1070 cu. ft., burning zone 2360 cu. ft., storage zone 4090 cu. ft.



General view of the gas burners of the new Peerless White Lime Co.

The kiln contains, when filled, 153 tons of lime and limestone equivalent to lime. Since the output is 50 tons per day, the average stone passes through the burning and storage zones in three days. While this travel is fast as compared with many other kilns, it *actually is faster* than almost any other kiln, if time of travel in the burning zone only is considered and the large storage zone ignored.

It is interesting to know that the outside of the kiln shell is 16 ft. There are many kilns which have this same shell diameter, and yet have an output of only 12 tons. The difference is due to the fact that in this case the shaft was made as large as possible without in any way endangering the steel work, also the shaft is kept working. The output per square foot of shaft area is 1380 lb. per day, while there are many kilns having an output of only 500 lb. per square foot of shaft area. One should realize that it is far better to have stone in the kiln than brick, also that the stone will not be calcined without heat; and the secret of capacity is to get the heat to the stone.

The high cooler permits air to be admitted from below, thus assuring cold lime that can be handled immediately; also the saving of heat that otherwise is wasted. Not all the air, however, enters through the cooler, but only that sufficient to cool the lime. Since the cooler capacity is about 20 tons, the average lump of lime remains in it about ten hours.

Slow Heating and Slow Cooling

The limestone entering kiln is gradually heated and gradually cooled. The purpose of the two firing levels is to force the kiln without harming either the lime of the kiln. The upper firing level is where most of the lime still contains core and so cannot well be overburned even when a large amount of heat is supplied. The zone where the lower firing eyes are is the finishing zone. Here the final traces of core are burned in a milder temperature atmosphere and of lower CO_2 concentration. From this zone

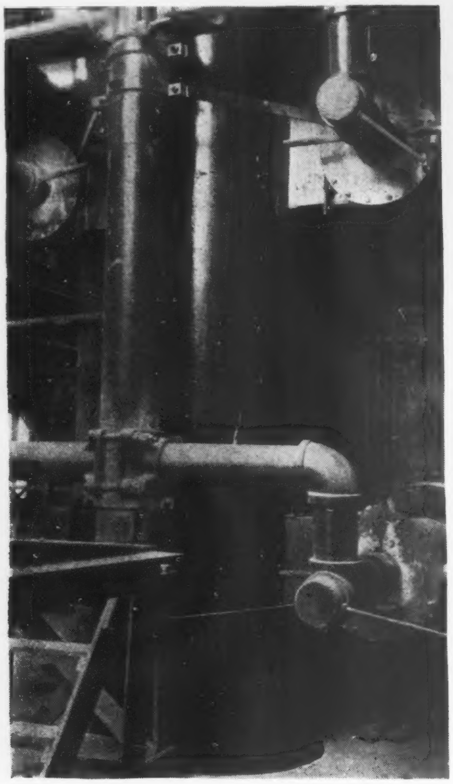
Poke holes in one side of kiln; at right is fan connection for recirculating some of the flue gas

the lime passes into the cooler where it is gradually cooled.

With this system there is less danger of harming the lime even though the kiln is drawn once every four hours. When drawing the kiln there is no interruption in firing. This eliminates the danger of re-carbonization and the waste of heat.

Special Features of Burners

Gas and air supplies can be regulated



Showing the relation of the four gas burners

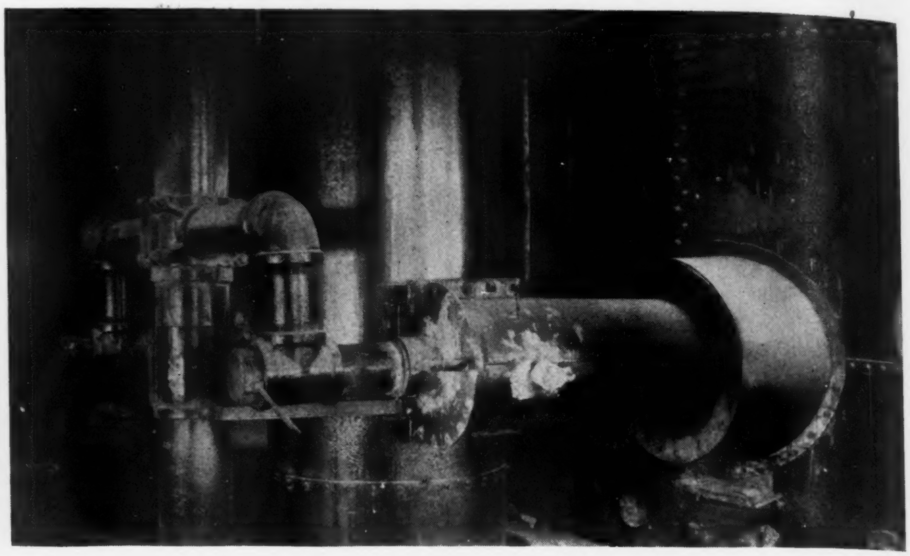
conveniently in any proportions; temperatures can be made high or low. An induced draft fan draws the gas from the kiln.

The gas producer has a gasification capacity of about 45 tons of coal per day. Since this is considerably more than what the two kilns would require, gas was piped to the old kilns. The old individual producers for each kiln, however, remain connected, to be used in an emergency.

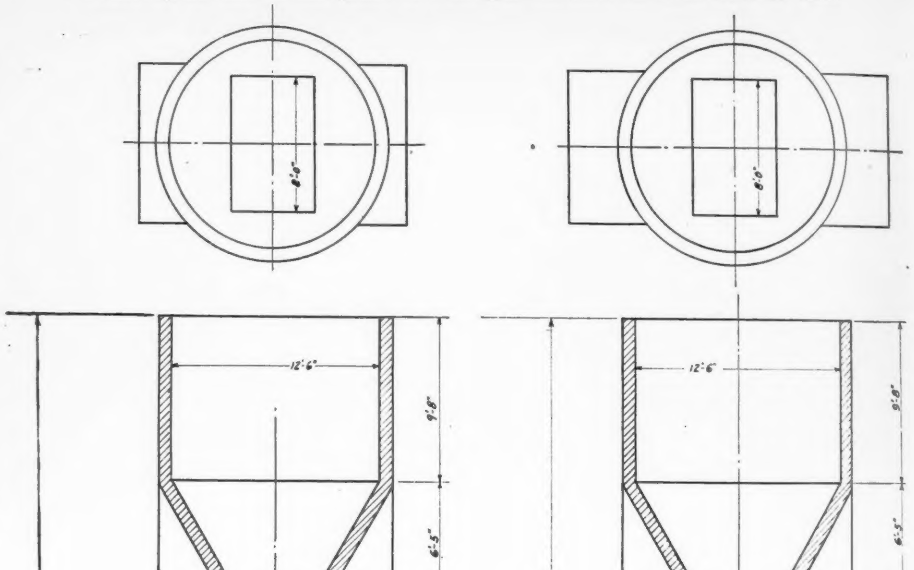
From the producer, the gas passes into a dust catcher, where much of the soot and dirt are removed, then into the distributing flues. The flues are lined with fire brick, not only on the inside, as ordinarily is the case, but also with insulating brick so as to reduce the loss of sensible heat from the gas.

Even though the kiln output is high, the working of the kiln is very easy. The time required for punching is very short, the kiln charge hangs, permitting a good trim, but does not hang hard. The kilns were equipped with a liberal number of small, tight, well-constructed poke hole doors.

Coal storage and its location in relation to the coal pocket is such that it can be



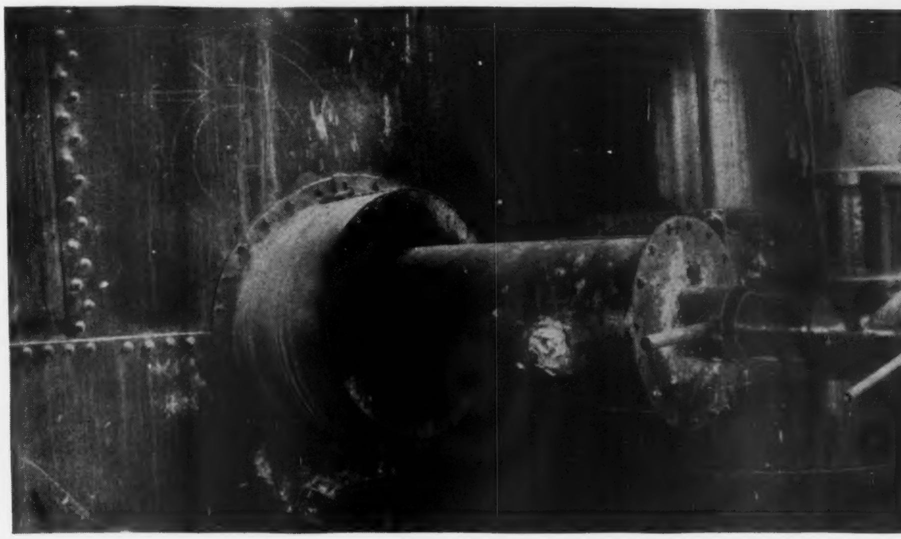
Close-up of one of the pairs of four gas burners on each side of kiln



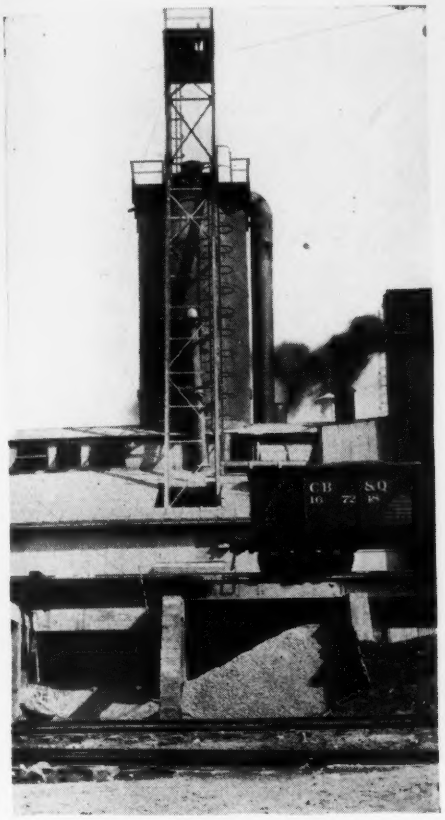
Cross-section through the older kilns at the Peerless White Lime Co.—Left, gas-fired with producers attached; Right, direct fired

drawn upon very readily with small labor cost. The amount of coal that can be unloaded directly over the coal pocket, due to height of the trestle, is large, as is also the coal bin capacity, therefore the storage coal need not be drawn upon except only infrequently.

Charging of stone is done with a skip which gets the rock from rock bins charged



Close-up of one of the four gas burners and adjusting mechanism



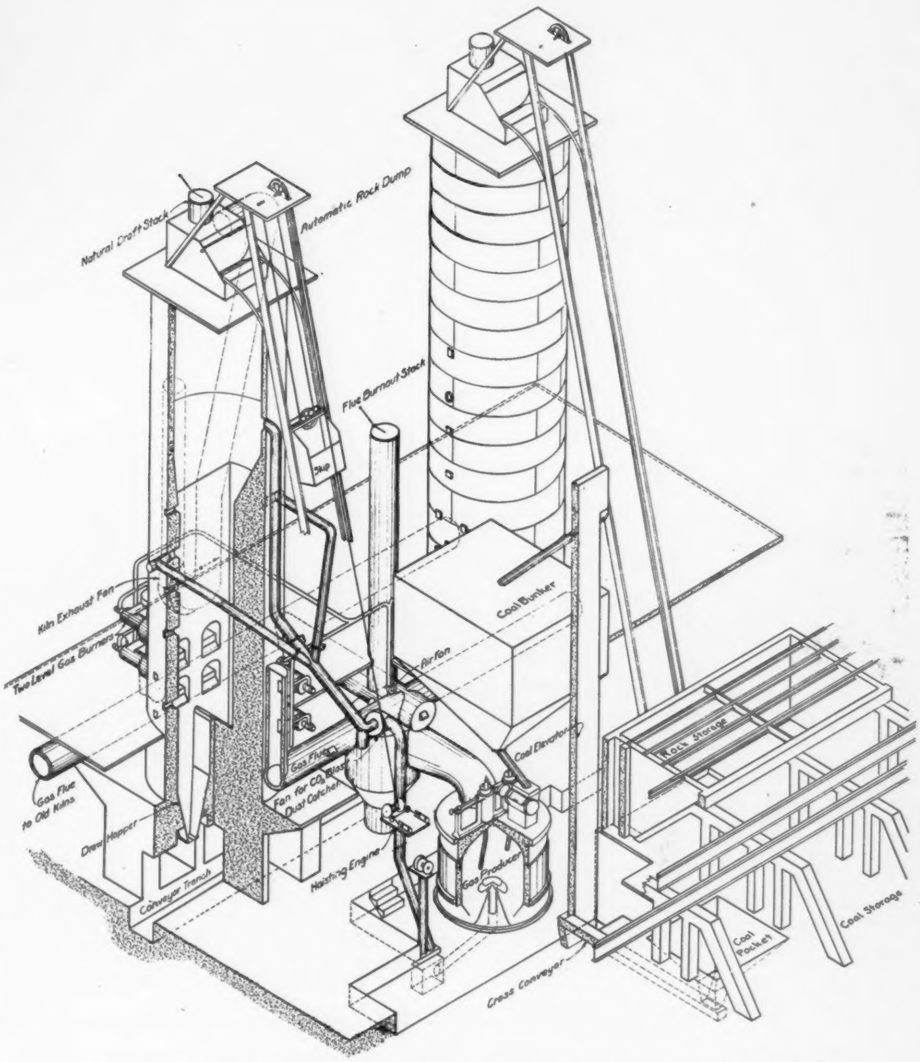
Side elevation of new kiln showing method of feeding

by the mine cars. The rock bins permit charging of kilns at night if it is desired and also on Sundays.

Experience here indicates that kilns having a shaft 6x12 ft. are not too large, and that from such kilns, if properly installed and equipped, such large quantities of lime can be obtained that there is no reason for larger kilns. Also experience proves that provided proper precautions are taken even though the capacity is high, the kiln life still will be as long as is desired, but then the flame must be tempered either by recirculating some kiln gas or by injecting a small amount of steam at the proper point. This kiln is equipped to temper the flame in either manner.

As stated in the opening paragraph, these kilns embody many of the theories of Victor J. Azbe, expressed in various articles and scientific papers, and worked out at this plant for the first time. These kilns are really the joint production of Mr. Azbe and D. S. Hunkins, vice-president of the Peerless White Lime Co., whose practical experience with lime-burning was of the utmost importance in perfecting many features of the design and in experimenting with the kiln to get it on a satisfactory operating basis. To Mr. Hunkins and Gordon Willis, president of the company, Rock Products and the lime industry is much indebted for the present publication of so many interesting details in regard to an experiment in lime-plant construction which cost them no inconsiderable sum of money and priceless time, energy and application.

The other officers of the Peerless White Lime Co., which is a subsidiary of the Hunkins-Willis Lime and Cement Co., St. Louis, Mo., are W. S. Fitzroy, sales man-



Isometric sketch of new kiln showing some of the construction details

ager; R. A. Burch, auditor; J. K. Billings, traffic manager; F. O. Withrow, superintendent; and Ralph W. Smith, mine superintendent.

Use of Lime for Treatment of Impure Water Studied

EXPERIMENTS made by the United States Public Health Service have failed to show that excess lime treatment of water gives a bacterial purification comparable to that of chlorination of the water, the Public Health Service announced in a statement on May 7.

A report submitted by the experimental laboratory at Cincinnati was made the basis of the statement issued by the service.

The full text of the statement follows:

The United States Public Health Service has for many years maintained an experimental laboratory at Cincinnati, Ohio, where studies of water purification and methods of sewage disposal have been conducted.

In a progress report submitted by this laboratory to the Public Health Service during March, the operation of the experimental water purification plant was recorded as having been in use during 21 days of the month, for a total of 414 hours. The total volume of water treated being 1,357,980 gal., of which 1,088,630 gal. consisted of river water and 269,350 gal. of sewage and dilution water.

During the period in which river water was pumped a series of observations was made, using treatment of the raw water with an excess of lime in order to study the possibility of substituting this form of treatment for chlorination in instances where taste-producing phenols are present in raw water. This method is being tried experimentally at the Cincinnati municipal filtration plant and at a number of water-softening plants, but little definite information exists as to its possibilities for the bacterial purification of water such as that of the Ohio river.

The results of these operations have not thus far shown that the excess lime treatment gives a bacterial purification comparable to that of chlorination of the filter effluent. These observations will be conducted in order to determine this point more definitely.

Combining field work with laboratory investigation has resulted in great progress being made in solving detailed problems in connection with methods of purification of river water for drinking purposes, and also in methods of simplifying the various processes adapted for the more scientific disposal of sewage and other industrial wastes being discharged by manufacturing plants into the navigable streams of this country.

This work of the Public Health Service is carried on in co-operation with various state boards of health and municipal water purification and sewage treatment plants.

New stone and coal-handling system under construction

Peerless White Lime Co. officials—from left to right: F. D. Withrow, general superintendent; D. S. ("Bud") Hunkins, vice-president; W. S. Fitzroy, sales manager; Victor J. Azbe, consulting engineer; Ralph W. Smith, quarry and mine superintendent; R. M. Hanks and Wm. Beckerman, lime plant foremen

Pacific Islands Phosphate Report

THE report of the British Phosphate Commissioners for the year ended June 30, 1926, has just been made public, says the *Chemical Trade Journal,* London. The year reviewed constitutes the sixth year of working under the commission. It is stated that production at Nauru and Ocean Islands in the 12 months to June 30 last declined considerably, but in spite of the exceptionally bad weather in the first six months of 1926 and other adverse conditions, shipments of phosphate rock amounted to 393,032 tons, as against 473,647 tons in the previous trading year, the highest ever recorded. Australia, of course, retained the premier position as a consumer, with only a slight decline in the proportion of the total exports, but actual tonnage was reduced from 336,810 in 1924-25 to 275,100 tons in 1925-26. New Zealand, which takes the bulk of the remainder of the shipments from the islands, took smaller purchases, at 98,250 tons as compared with the previous total of 99,466, though her proportion of exports advanced from 21.01 to 24.97. Exports to Japan and other countries at 19,682 were about half the quantity sent in 1924-25. The shortage thus experienced in Australia necessitated importations from Morocco and the United States. Exports from the former country in 1926 amounted to 6,258 tons, but details of American supplies are not yet available. The present year, however, should see the position retrieved, for improved weather conditions have prevailed there during recent months, and as a consequence good progress has been made with regard to exports from Nauru and Ocean Islands.

Erratum

THE address of Miss Ellen Knight, secretary of the Sand-Lime Brick Association, is Saginaw, Mich., and not Hummelstown, Penn., as incorrectly stated in ROCK PRODUCTS, May 14 issue.

Plant of the Roquemore Gravel Co., the largest in the district

Sand and Gravel Practice in the Montgomery, Ala., District

Extensive Improvements in Plant Design and Operation — Operations Increasing Capacity

By Edmund Shaw
Editor, Rock Products

THE sand and gravel district in and around Montgomery, Ala., was visited by the writer about three years ago. A recent visit showed some rather surprising changes in plant design and operation had been made. The same companies in operation at that time are operating today: the Roquemore Gravel Co., the Montgomery Gravel Co., the Alabama Sand and Gravel Co., the Kirkpatrick Sand and Cement Co., and the Underwood-Walker Co. It was at a time when several new plants had just been built. The big Roquemore plant was completed and was just ready to operate. The Montgomery Gravel Co. had been running its plant at Arrowhead for less than a year and the Alabama had a plant which was still spoken of as the new plant of the company (which has built many plants) although it was more than a year old. The Kirkpatrick company and the Underwood-Walker company had each built new dredges and put up plants of simple design.

Plants Increase Capacity

The Roquemore company has not changed its plant or its practice particularly, but it has added greatly to its digging and transportation equipment. The Montgomery company has opened a new deposit, built a new dredge and washing plant, and temporarily closed its Arrowhead operation. The Alabama company has also opened a new deposit and built a new plant on its old location and it intends to build another shortly on the newly opened deposit, two miles distant. The Kirkpatrick company has a new full-Diesel power dredge which it is using as a booster and the Underwood-Walker Co. also has a new booster equipment which, however, is installed on the shore.

Sand and Gravel Deposits Extensive

This sand and gravel district is one of the most interesting, as it is also one of the most important, in the United States. It is probably the largest area of sand and gravel land, so placed that it can be worked commercially, outside of the glaciated area. It lies on both sides of the Alabama river

Washing and screening plant of the Montgomery Gravel Co.

Newly erected plant of the Alabama Sand and Gravel Co.

Washing plant at the Jackson's Lake operation of the Kirkpatrick Sand and Cement Co.

Underwood-Walker Co.'s Washing plant at Prattville Junction

for some miles and at some points its width is measured in miles. No one familiar with the district was found who would make an estimate of the number of square miles of workable ground, or the probable life of the district. The land has not been prospected sufficiently for any accurate estimating. One who is probably as familiar as anyone with the district and its working conditions said that he thought the known deposits were good for 20 years. This supposed the rate of working, the price of sand and gravel and the cost of operating to be what they are today. But he looked for the district to have a longer life, for there is an immense acreage where the overburden is heavy, where layers of clay interfere with the working, or where the percentage of gravel is low, not considered workable today but which will be workable when the price of gravel goes up.

The time when such deposits will become profitable may come sooner than his estimate anticipates. Alabama is woefully behind other states with the same wealth and population in the building of concrete highways, and Georgia (which uses a lot of gravel from Montgomery) is in about the same condition. Both states are just beginning to build paved highways, and experience has shown that every concrete highway creates a demand for another, as Alabama is a great industrial state with a rapidly growing population and an equally rapid increase in wealth, there can be no hardship in issues of road bonds. The coming concrete highways alone may be expected to offer a considerable increase in the market for the gravel of this district.

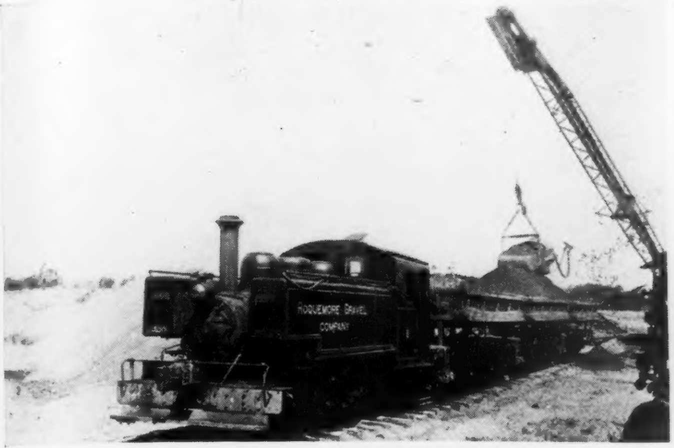
Favorable Operating Conditions

This gravel bearing area is not only large but it has about as advantageous working conditions as may be found anywhere. The overburden is not heavy and most of it is of fine sand which gives no trouble in washing. Some of it is even saleable. The deposit is of good working depth, from 30 to 50 ft. and the quality of the material is exceptional. I have looked into a good many cars and picked over stockpiles without finding a clay ball, a piece of soft rock or any other deleterious material. The percentage of clay is low and it is not the kind of clay that makes hard films on the pebbles. The simplest sort of apparatus will wash and clean it and there is not oversize enough to pay to put in a crusher at even the largest plant in the field.

Of course there is always a drawback and, if you enthuse about the quality of the deposit to one of the producers here he will be sure to say, "Yes, I suppose that is all true, but I wish there was more gravel and less sand." From the present point of view he is right, but from a future viewpoint he may be wrong. The percentage of gravel is quite as high as the deposits worked for sand and gravel around New York and

Face of the Roquemore deposit. Water is pumped from the river to the pit from which the wash water is drawn

Looking over the Roquemore deposit—the drainage cut recently made is clearly shown



New type of dinkey at Roquemore plant

New dragline recently installed at Roquemore operation. It is used especially to work out corners

Philadelphia from which all the sand and all the gravel are sold. But the market here for sand is less than in those cities and the competition is greater. Georgia producers compete in sand in both the Birmingham and Atlanta markets for one thing.

Offsetting this is the fact that, taking the state as a whole there is considerable coarse aggregate produced that needs sand to accompany it. The other large sand production of the state is from dredges on the Tombigbee and Warrior rivers and it is said that sand is growing scarce in these rivers although gravel is still abundant. Birmingham slag, produced now by several companies, is the principal coarse aggregate used in this part of the country. I do not know exactly what the tonnage of crushed slag amounts to, but am reliably informed it is much more than 2,000,000 tons yearly. Probably 3,000,000 tons would be nearer the mark, and every ton which goes into concrete calls for at least half a ton of sand. A little crushed stone is also produced. With the increase in the production of these coarse aggregates there will come an increase in the demand for concrete sand, and as the industries of the state grow there will be a demand for sand for other uses. At least one of the large companies here understands this and is putting its excess sand where it can recover it easily.

Roquemore Plant Improvements

The Roquemore plant was the first visited and J. H. Whigham, sales manager,

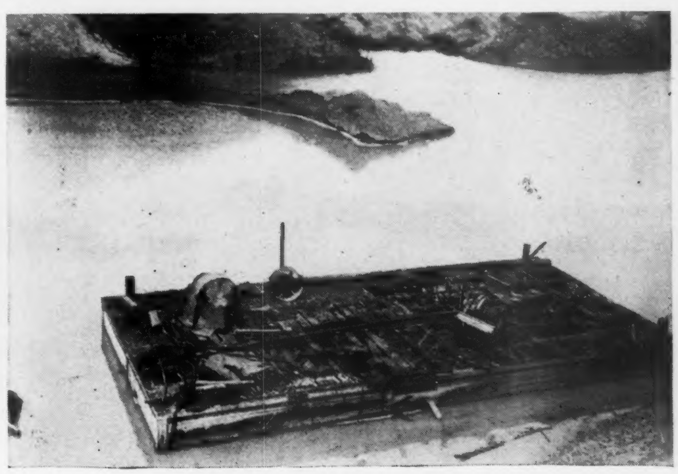
With four streams from the bin a car is loaded in less than three minutes

drove me out and pointed out the improvements made. Cars were moving in and out of the plant pretty rapidly but he said the loading was not at all fast compared with that in the peak of the season. This plant has a small bin capacity for its tonnage, hardly more than enough to permit cars to be changed. Each bin has four gates and a car is filled in three minutes. The gates, I noted, were simple slides of iron plate working in grooves and handled by a lever at the side. The original lever system has been changed to give the lever a longer throw and put more force on the opening and closing motions. The original gates are still in use after three years service.

New Sand Settler

A new sand settler had been built and it settles the fine sand in the overflow of the concrete sand settlers. This fine sand has a limited market for mason's use and for some sorts of plastering. We went into the plant by the side of the 48-in. conveyor belt that brings in the bank material and everything was as I remembered it when the plant was first built. Frank Welch, of the Greenville Gravel Co., designed this plant and did a good job, as its three years of steady running testifies. It was built large enough to meet highest peak load and as much as 200 cars daily have been shipped.

Overhauling a dragline at the Roquemore plant

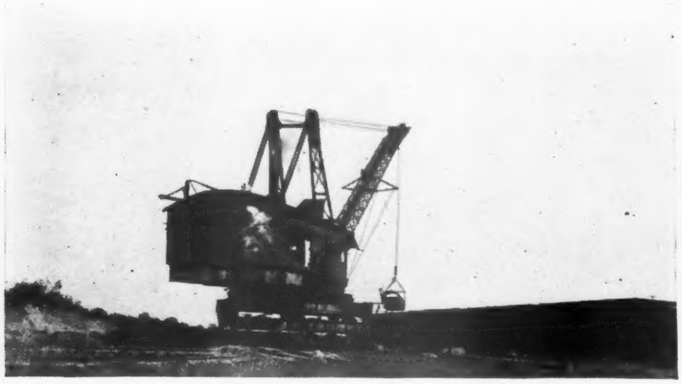


Remains of the Roquemore dredge which was burned recently

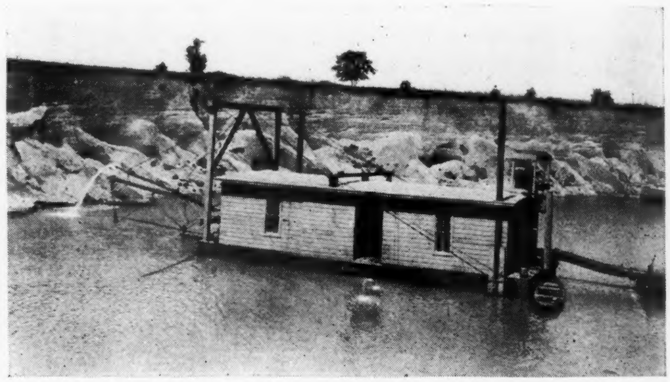
The important improvements made are in the digging and transportation departments. When the plant started only one dragline, a Class 24 Bucyrus, was in use. Another of the same class has since been purchased and quite recently a class 80 Bucyrus has been bought. This is an entirely different type of machine and is being used especially to work out corners. One of the Class 24 draglines was being overhauled the day the plant was visited and Mr. Whigham said it was customary to give each dragline a thorough going-over as the work permitted, to be sure all were in good shape at the time of the heaviest shipments.

A new dinkey, of the type shown in one of the cuts, had just been placed in service and two others like it had been ordered and were on their way to the plant. It weighs 22½ tons and was made by the American Locomotive Works. The company will standardize on this type, replacing other dinkeys by it. It is also standardizing on its cars. Both 6-yd. and 12-yd. cars were in use when I was at the plant the first time but now only 12-yd. cars are used. They are of a heavy pattern, side dump, made by the Western Wheeled Scraper Co. With the four yard Page buckets used by the larger draglines the 6-yd. car is hardly suitable. The Class 80 dragline uses a 2½-yd. bucket which works well enough with a 12-yd. car.

The top of this tower is the fanning table; the screens are below over the bins (Montgomery Gravel Co.)



Dragline loading cars at newly opened deposit of the Alabama Sand and Gravel Co.



New dredge of the Montgomery Gravel Co. working in a well prospected deposit

System of Working at Roquemore Plant

Three years digging of such a large tonnage as has been put through by this plant makes quite a good sized hole in the ground. The work is carried on about three-quarters of a mile from the plant and is of a rather wide elliptical shape. The system of working is the simple one of using a single track running around the pit, changing the track over as the pit increases in size. Cars go out from the plant and make the complete turn, coming into the plant the same way. Changing the track and moving up the dragline has been systematized to take as little time as possible. Switch points are used to avoid cutting rails. In the rush season all track work is done at night so that production is not interfered with.

The deposit is near the river and was flooded at one period of high water and a cut had to be made to drain it. This has been made into a permanent drainage channel so that the water can flow in or out as the river rises or falls. The bottom of the deposit is under water all the time; in fact it is the main source of wash water for the plant. But in a dry time it does not make enough water for the plant needs and two 6-in. pumps at the river are worked intermittently to keep up the supply.

The Roquemore company formerly operated a dredging plant and has kept the dredge ready for service until a short time ago when it caught fire and burned. Nothing was saved but the big pump. A small pump on the dredge which was electrically driven, was being used to supply water to the draglines and it is supposed that the fire originated from a defect in the wiring.

Pond and dredge of the Montgomery Gravel Co.

Montgomery Gravel Co. Plant

The new plant of the Montgomery Gravel Co. was the next visited and as this is to be the subject of a detailed story to be published shortly it will not be described here more than to say that it is an exceedingly simple plant but very well constructed and designed. J. C. Bible the sales manager of the company was largely responsible for its design and he appears to have appreciated that with material such as is dug in this field the simplest kind of a plant will do efficient work. Mr. Bible's experience in the sand and gravel business has been large, for he was "brought up" in the

J. C. Bible, who designed the Montgomery Gravel Co.'s plant

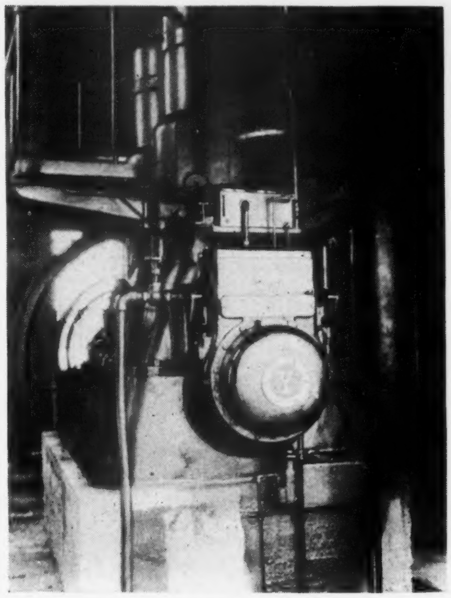
business. His father, H. L. Bible who died last year, was one of the pioneer producers in the country. J. C. Bible got his education as a boy on his father's sand dredge at Chattanooga. Afterward he was with the New England Sand and Gravel Co. and later he visited all the important plants on the Atlantic Coast and some in the Middle West.

Before deciding to build this new plant the company tested the ground about as thoroughly as any piece that I have seen prospected. Test pits were sunk every hundred yards square over 580 acres and samples were screened and washed and recorded so that the company knows just what it will find as its work proceeds. The deposit is unusually rich in gravel.

Alabama Company Still Dredging on Original Holdings

The Alabama Sand and Gravel Co. is the oldest in the district and it has worked out an immense area. It is still dredging on its original holdings but quite recently it acquired 1000 acres of land two miles away which it prospected thoroughly and then opened. A good many test pits were sunk, some of them being boarded up so that they could be kept open permanently for examination. This new deposit, too, is unusually rich in gravel.

M. H. Andrews, the superintendent of this company has been in the business in the Montgomery district as long as anyone for he was associated with J. D. Roquemore in the first operation here. The company has built a number of plants in his time ranging from the simple dredge plant with gravity screens to a rather elaborate plant of the standard type with revolving screens and automatic sand settlers. And it is his judgment that the simple plant with gravity screens and vibrators will do all that is needed. The new plant will be described in



New cold-start Diesel engine in Underwood-Walker booster plant

detail later. It is so successful that the plant which is shortly to be built on the newly opened deposit will follow the same lines.

Simple Transportation System

The system of transportation for this operation has been very well worked out. The cars are 50-ton hopper bottomed steel cars of standard gage and three trains of four cars each are used. The dragline fills a train, the cars being moved up by a dinkey. When the last car is filled a 65-ton locomotive used only for the long run, picks up the train and takes it to the plant. Another dinkey takes it at this point and pushes the cars through the unloading point while the transfer locomotive picks up the empties and returns to the dragline. By the

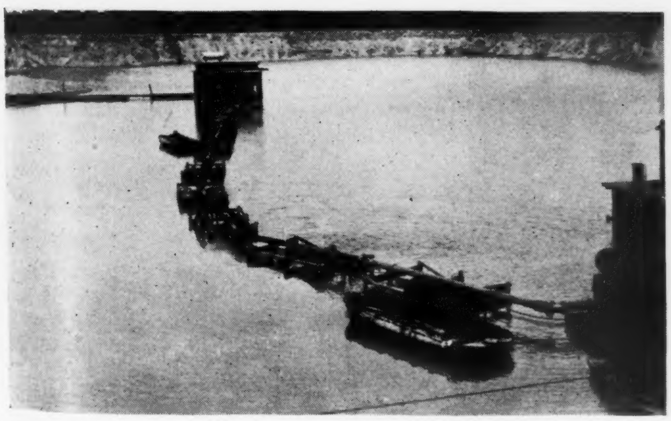
Underwood-Walker dredge at Prattville Junction

time it gets back another train is ready for it and it passes the empties to the dinkey, picks up the loads and goes back to the plant. Twelve cars an hour have been handled in this way and the dragline kept continually supplied with cars.

This company is of wholly local capital and it is under the management of L. L. Iddings, whose title is assistant to the president.

Diesel Operated Plant

The Kirkpatrick Sand and Cement Co.'s operation at Jackson's lake, about seven miles from Montgomery is one of the most interesting in this field because it employs two Diesel engine driven dredges (both of Worthington make) one acting as a booster. This booster dredge built about four months ago is the first the writer remembers seeing which was designed for boosting and nothing else. Like the main dredge it was designed by A. Mohan, the engineer of the company and it contains some very ingenious engineering features which are to be described in a forthcoming issue. The plant is a simple one built after Mr. Mohan had visited some of the principal sand plants of the country. It contains gravity



Main dredge and booster dredge, Kirkpatrick Sand and Cement Co.

The main dredge digging at the Kirkpatrick deposit near Jackson's Lake

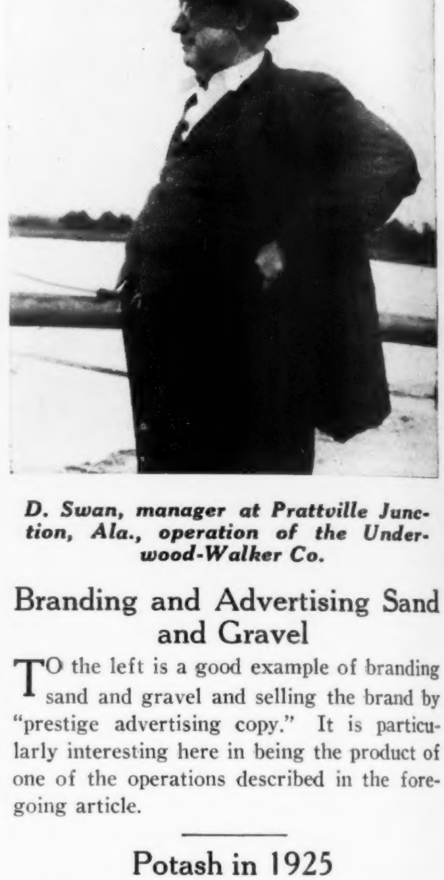
screens, Allen cones and special sand boxes with dewatering elevators in which the sand is rinsed.

P. E. Chalifoux, the treasurer of the company is also treasurer of the Mobile Gulf and Navigation Co., a large producer of sand and gravel in Mobile. The company also operates a core sand plant in Georgia and has a large retail yard and building material business in Birmingham. It operates another plant at Casooda, Ala.

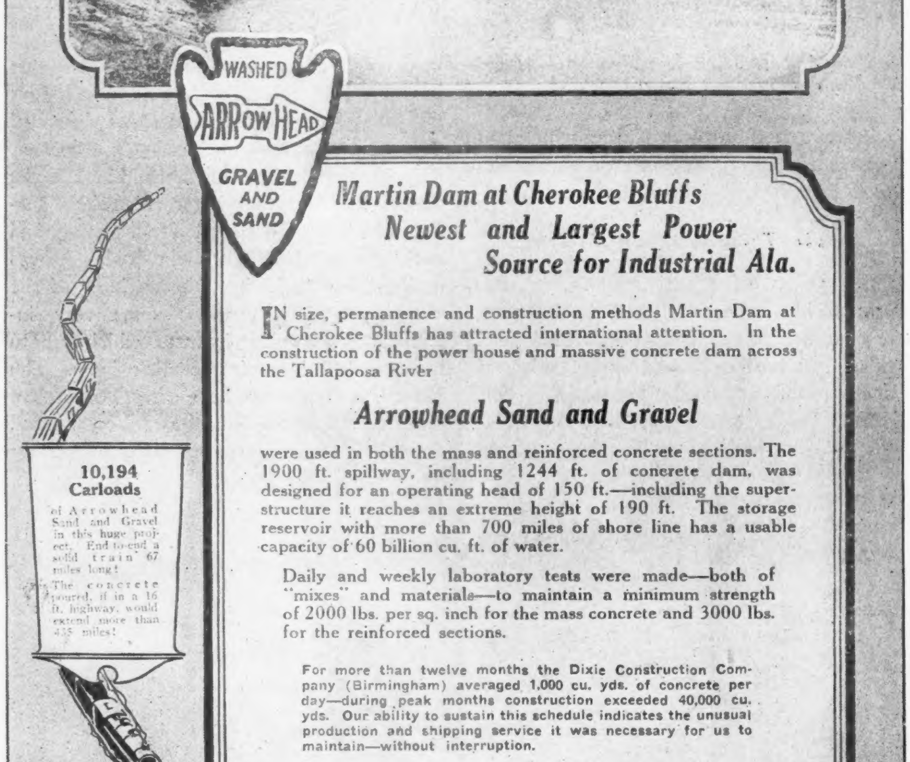
Although the Kirpatrick plant is usually spoken of as a sand plant, records show that about 40% of its production is gravel.

The Underwood-Walker Co. of Birmingham has a plant at Prattville Junction, about nine miles from Montgomery. This also is a dredge plant using Diesel engine power. The dredge, built about three years ago was designed by W. H. K. Bennett and the engine was made by Fairbanks-Morse. A few months ago it became necessary to install a booster and another engine of the same make (but of the new cold-start type) was installed in a house on the shore. This is a very pretty installation running as easily and smoothly as possible.

The plant is of a simple type with gravity screens and two sets of sand tanks with manually controlled valves. A screen divides the fine sand from the coarse. D. Swan is the manager of the plant. This company operates sand pits in Georgia and other parts of the South. The Central of Georgia railway operates a ballast plant in this district and there is another sand plant which has passed through several hands and is at present not operating.



D. Swan, manager at Prattville Junction, Ala., operation of the Underwood-Walker Co.



An example of "prestige advertising" of a branded sand and gravel

Branding and Advertising Sand and Gravel

TO the left is a good example of branding sand and gravel and selling the brand by "prestige advertising copy." It is particularly interesting here in being the product of one of the operations described in the foregoing article.

Potash in 1925

PRODUCTION of potash in the United States during 1925 showed an increase over 1924 of 18% in crude potassium salts and of 11% content in the K_2O content. Sales of crude salts were 41% larger and the potash content of the material sold in 1925, 18% larger than that of 1924. Total value of sales increased 43% and the value per unit (20 lb. of K_2O) was 47 cents as compared with 39 cents in 1924. For the first time since 1919 sales were larger than production. Stocks decreased about 4½%.

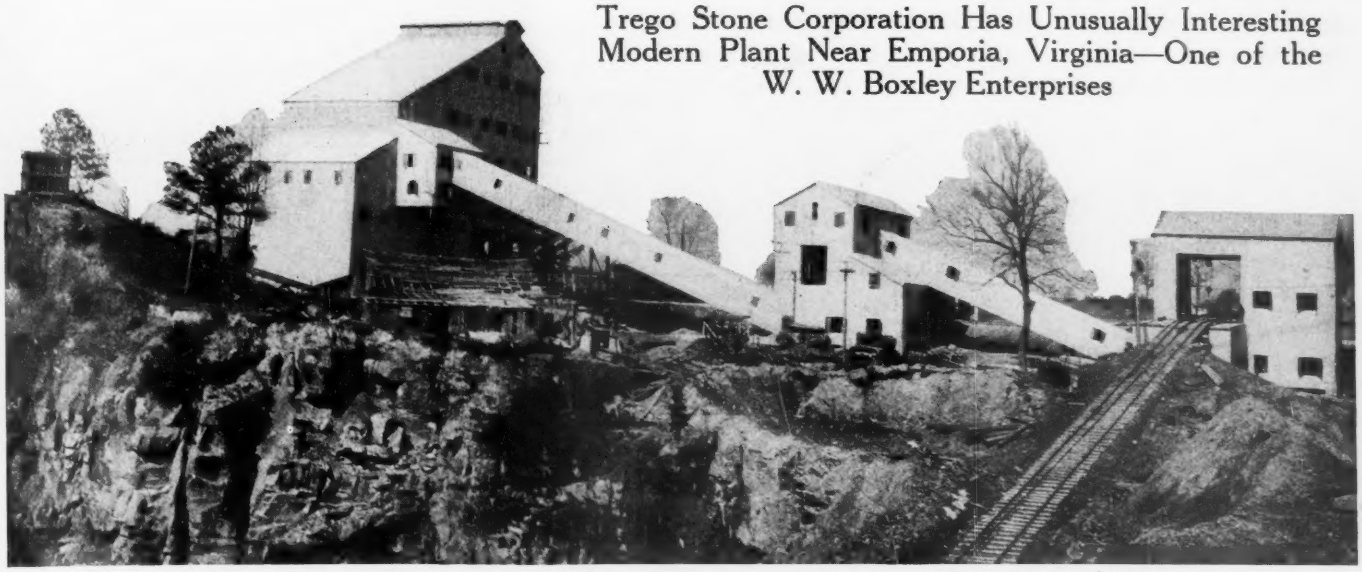
Production was chiefly from natural brines, flue dust from blast furnaces and from molasses distillation. No potash materials were made from cement dust, although there were a few sales from stocks. The Santa Cruz Portland Cement Co. discontinued the recovery of potassium salts from cement dust at its Davenport, Calif., plant and disposed of all stocks. Several potash-bearing localities in Texas, New Mexico and other places were investigated.

Imports of potash salts were about 10 times the production in 1925 and about 29% more than in 1924. About 94% of all the potash used went to the manufacture of fertilizer. Prices of the lower grades, imported from Germany and France, were advanced twice during 1925.

The summarized report concerning potash in 1925 is available at 5 cents per copy from the Superintendent of Documents, Government Printing Office, Washington, D. C.

One of the South's Newest Stone Plants

Trego Stone Corporation Has Unusually Interesting Modern Plant Near Emporia, Virginia—One of the W. W. Boxley Enterprises



New crushing plant of the Trego Stone Co. The old quarry shows at the left and the old plant between two of the new buildings

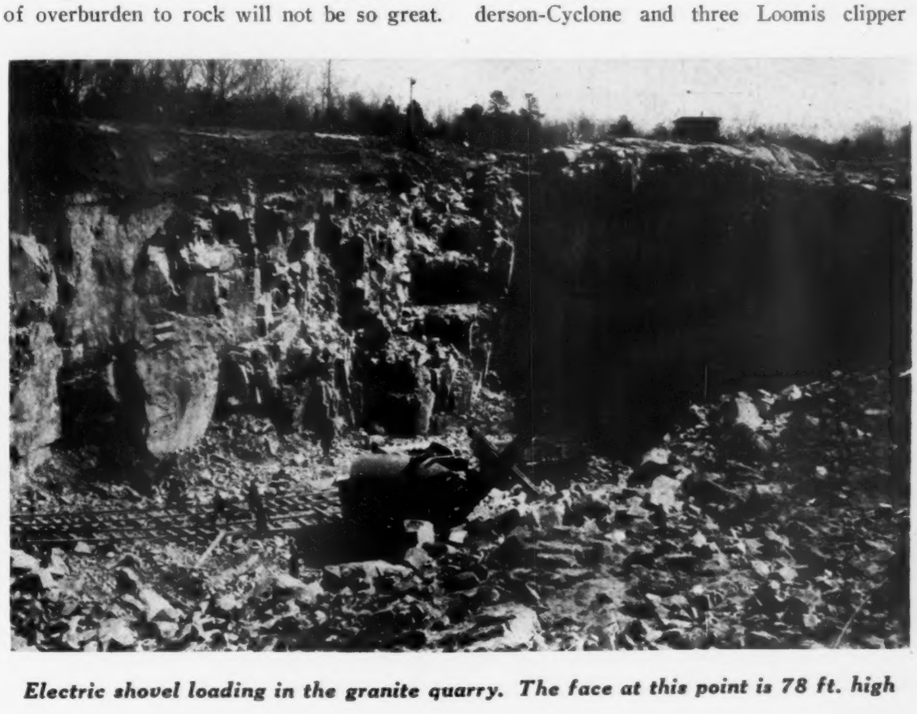
THE Trego Stone Corp. is one of the enterprises of W. W. Boxley, of Roanoke, Va., and his associates, operating large crushing plants in other parts of Virginia. This plant is near Emporia, Va., which is about 54 miles from Petersburg and not far from the North Carolina line. It crushes granite and all the product, coarse and fine, is used by the railroads for ballast and other purposes. The plant is Allis-Chalmers designed and equipped and is one of the newest in the southern states. It had been in operation about a month when a ROCK PRODUCTS editor visited it in March this year.

The reason for the construction of the plant is rather interesting. It was known that a large quantity of ballast was needed for the Atlantic Coast Line and A. W. Lumsden, manager of the Pembroke Limestone Corp., Pembroke, began to hunt for a suitable rock to work into ballast. He prospected the granite ridge that runs through Virginia and down into the Carolinas, feeling sure that somewhere he could find what he wanted—a granite, hard and tough enough to make good ballast and also of the right structure so it would not be too expensive to quarry and crush. There is a wide difference in the granites to be found in various parts of the granite belt, for the older rocks have been intruded by later granite flows which made dikes and similar geological formations. These later granites are said to be somewhat finer grained and firmer than the older rock.

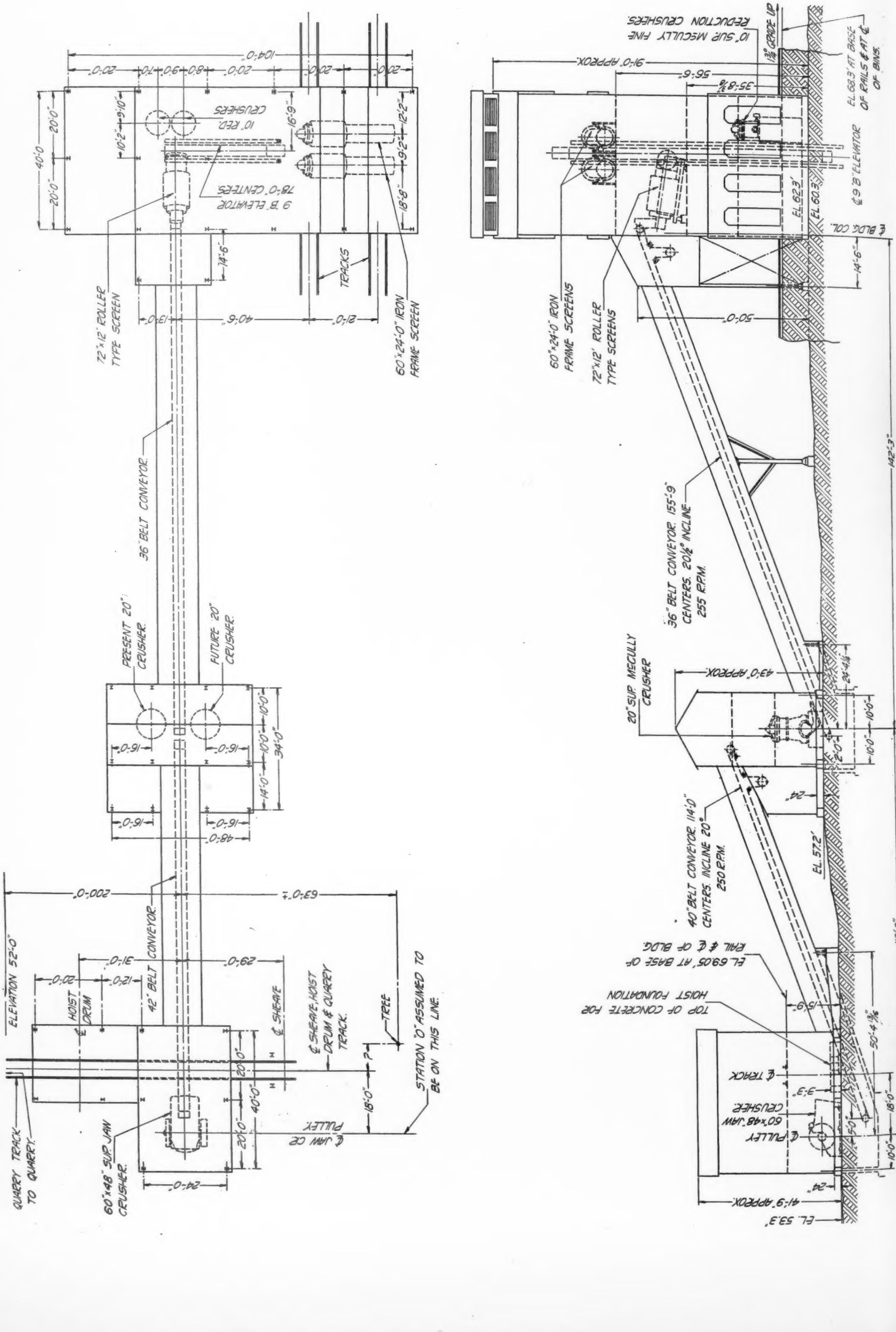
Mr. Lumsden hunted for several months without finding anything that looked to be what he wanted. One day he saw a railroad sign, "Stoney Creek," which suggested stone, and working from this point he found a small quarry and crushing plant which in former years had produced some ballast. The quarry was opened sufficiently to show what the stone was like in depth and a survey with test pits dug through the overburden to the rock developed an ample area to justify a large scale crushing operation. After he had made a preliminary layout the Allis-Chalmers engineers were engaged to design the completed plant.

An average of 12 ft. of overburden has to be removed before the rock is quarried, but this is not such a handicap as it would seem to be at first. The present quarry face is 78 ft. high, but it will be deepened as the work goes on farther so that the proportion of overburden to rock will not be so great. This overburden is of clay and fine sand and is dug by an Erie steam shovel with a 1 yd. dipper. The dirt is removed by a Vulcan dinkey locomotive and 4½-yd Western side dump cars. All the overburden removed so far has been needed for fills and track grading. In the stripping, some care has to be taken to leave ditches to run the surface water away from the quarry to the river which is one side and nearby. At present the bottom of the quarry is wet enough to require the operation of a 150-gal.-per-min. centrifugal pump for two hours in every 10 hours.

The stripped rock is drilled with a Sanderson-Cyclone and three Loomis clipper



Electric shovel loading in the granite quarry. The face at this point is 78 ft. high



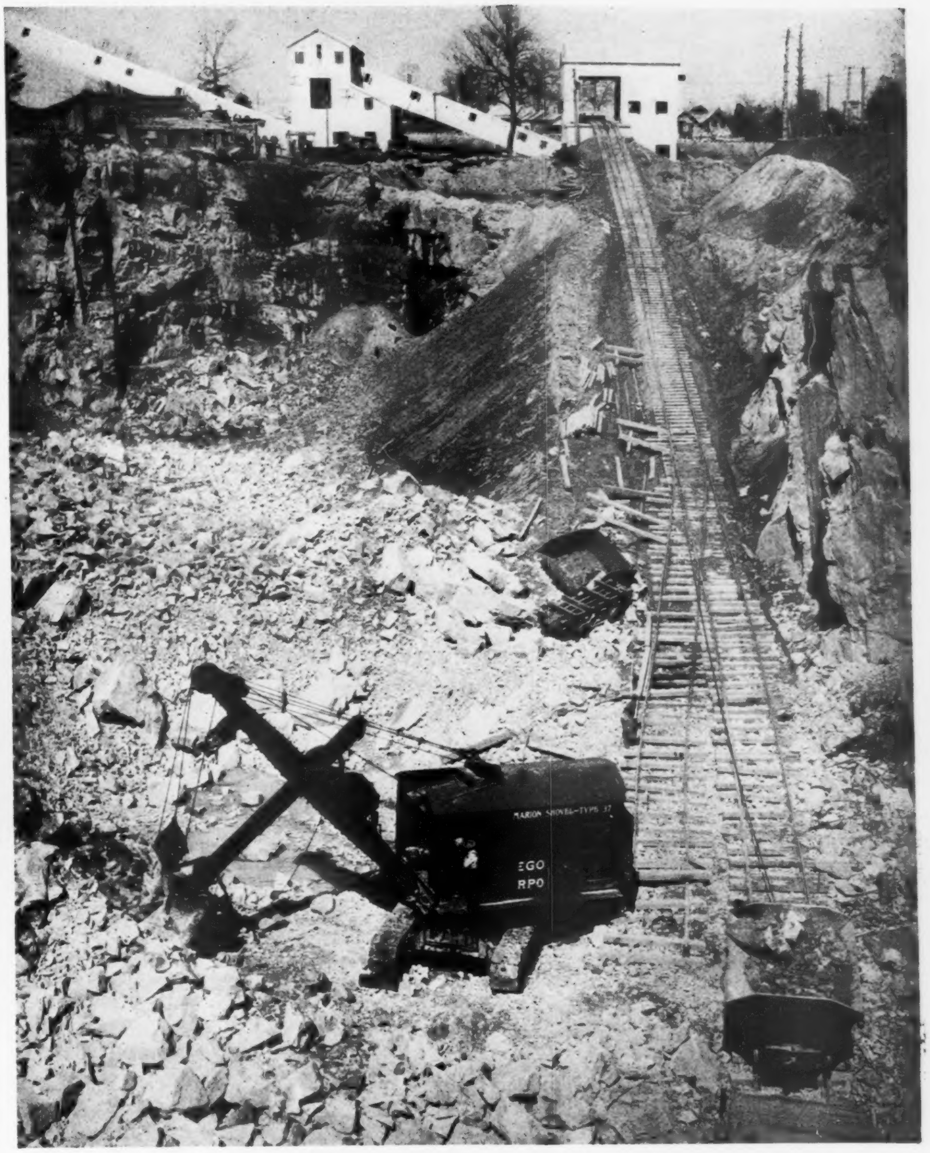
General plan and elevation of the new crushing plant of the Trego Stone Corp., near Emporia, Va.

drills. In spite of its hardness and abrasive qualities the rock drills well and as much as 25 ft. per day has been made. Holes of 6⅝ in. in diameter are set 16 ft. apart and given 20 ft. burden and they are loaded with 40% and 60% powder for the lower two-thirds of their depth. The shot fired a day or two before the quarry was visited was just being loaded by the shovel and it showed

Drills put down 25 ft. per day despite the hardness of the rock

that the fragmentation was very good. A Marion No. 37 electric shovel loads the broken rock on a car that runs on an incline with 19% grade. This car is of Koppel make and holds 11 tons. It is pulled up the incline by an Allis-Chalmers electric hoist with a 6-ft. drum. The electrical equipment includes a set of automatic contactors for building up the speed; and the levers for starting and stopping are carried to the floor of the crushing plant above. A 1¼-in. cable is used.

The quarry had not been opened a sufficient distance to permit the use of more than one car when the plant was visited, but arrangements were being made to add a second car. As the hoist can make a round trip with a car in two minutes, the expected tonnage of 2500 tons daily can be made easily when more cars can be loaded. In fact this can be increased to more than 3000 tons and will be when the demand justifies it.

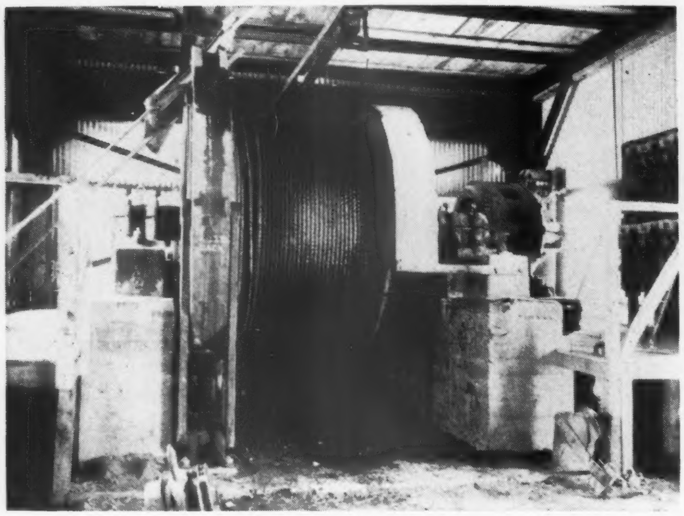


The quarry bottom showing the incline running to the main crushing plant

Primary crushing plant

End view of the plant

General plan and elevation of the new crushing plant of the Trego Stone Corp., near Emporia, Va.

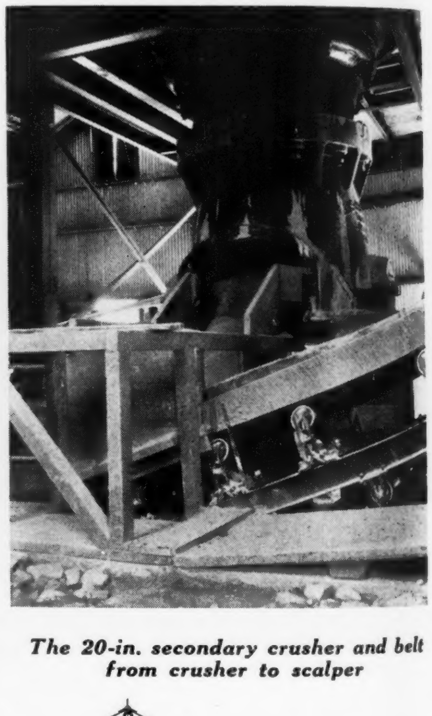


Hoist for pulling cars up the incline

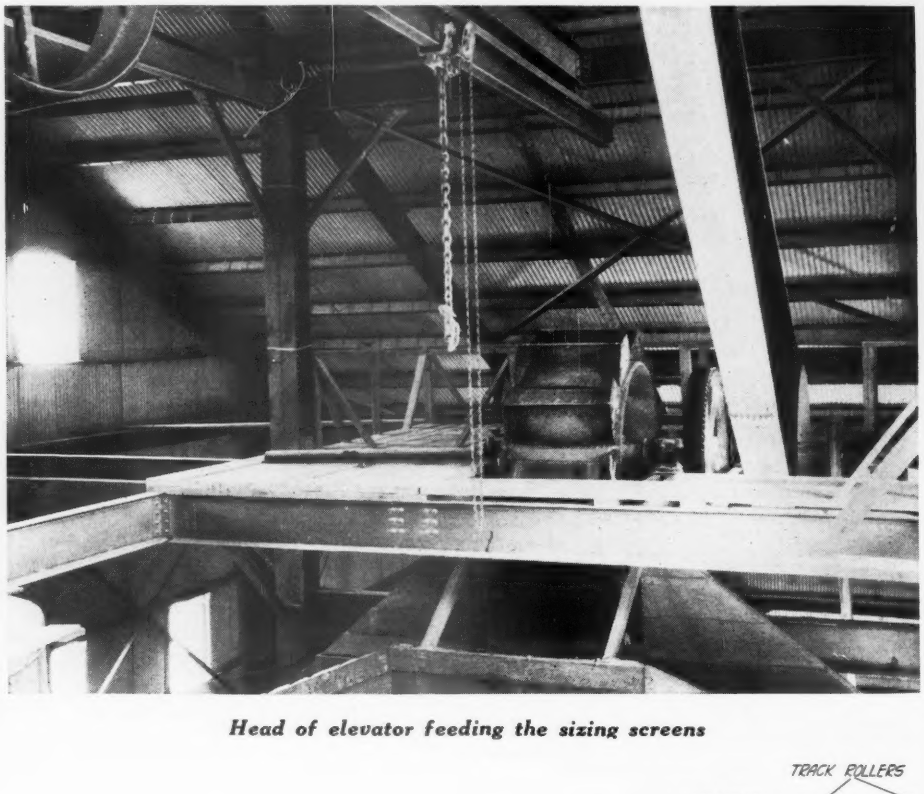
An 11-ton car dumping to the primary jaw crusher

The car dumps directly into a 48x60-in. "Superior" jaw crusher, the dumping being done by a small steam hoist on the lower floor of the crusher house, which is run by compressed air. Later another device will be installed but the hoist will be kept in its present position and used to turn over the jaw crusher in starting. A feature of this crusher house is a 20-ton chain hoist over the crusher, used originally to set it in place and now kept for handling parts in making repairs. The crusher has water cooled babbitted bearings and a duplicate pump is provided so water flow will not be interrupted.

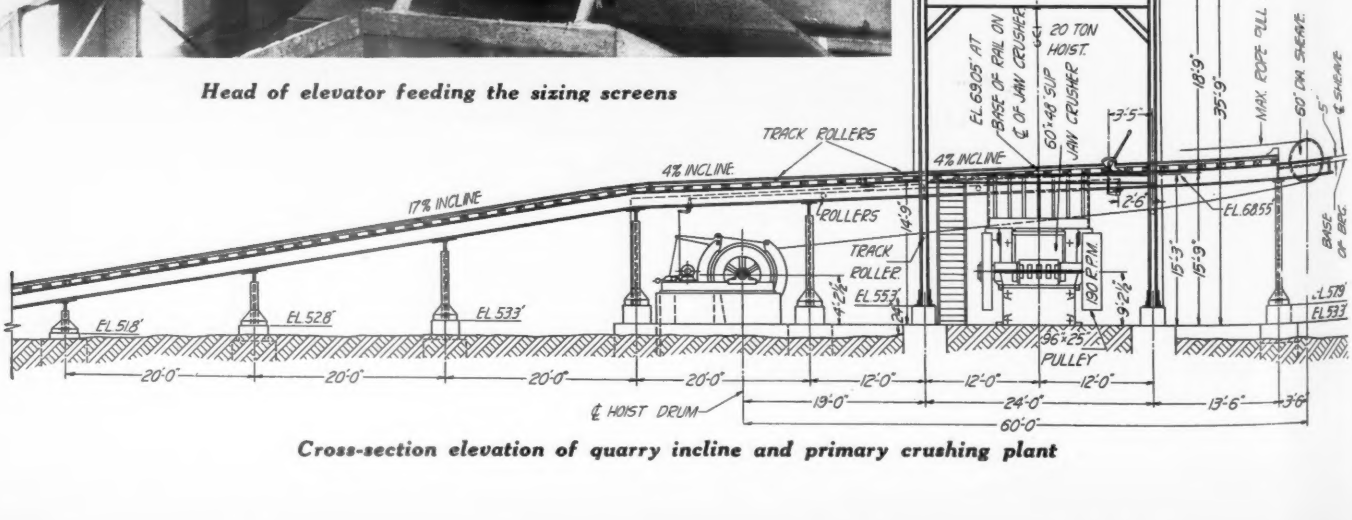
From the crusher the rock goes to a 42-in. 114 ft. centers, Stephens-Adamson belt conveyor. At present this discharges di-



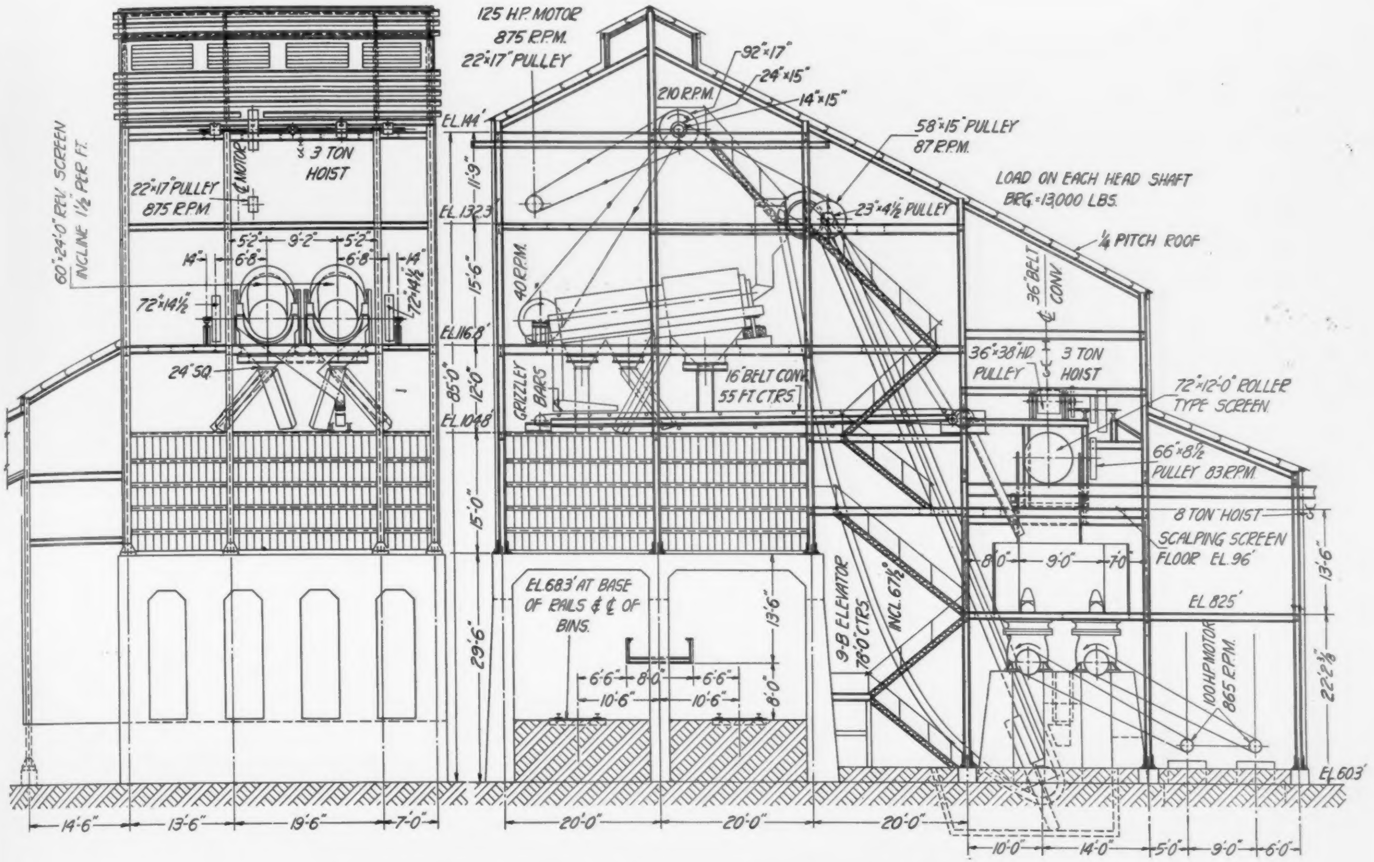
The 20-in. secondary crusher and belt from crusher to scalper



Head of elevator feeding the sizing screens



Cross-section elevation of quarry incline and primary crushing plant



Cross-section elevations of the screening and recrushing plants

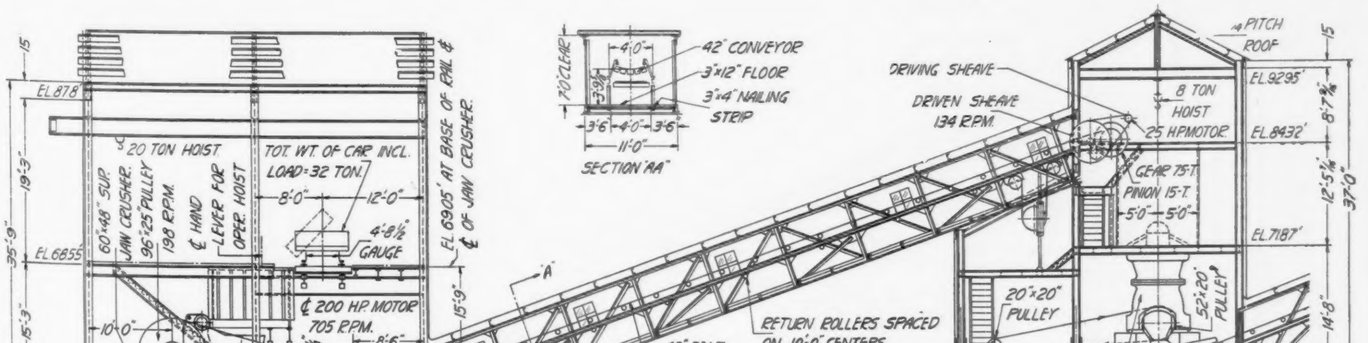
rectly to the secondary crusher but later it will discharge on a grizzly and the undersize will by-pass the crusher.

The secondary crusher is a 20-in. "McCully." The discharge goes by a chute to a second Stephens-Adamson conveyor of 160 ft. centers. This has a 36-in. belt and it discharges directly into the scalping screen which is 12 ft. long and 72 in. in diameter. It has 3-in. round hole perforations and everything passing these goes to a 36-in. bucket and belt conveyor of the close-connected type of Allis-Chalmers make. The buckets are carried on a 12-ply belt.

The oversize of the scalping screen falls into a bin and flows from the bin into two 10-in. "McCully" reduction crushers. The discharge of these joins the undersize of the scalping screen in the boot of the elevator. The elevator of about 70 ft. centers raises the rock to the sizing screens which are placed above the bins. There are two of these screens, each 24 ft. long and 60 in. in diameter in the main section. The perforations are 1-in. and 2½-in. round holes and the dust jacket has ½-in. round holes. But at present only two products are made, one from 2½ in. to ½-in. and the other from ½-in. down to dust. Later it is expected to develop a commercial stone business and shaking screens will be added to make the smaller sizes.

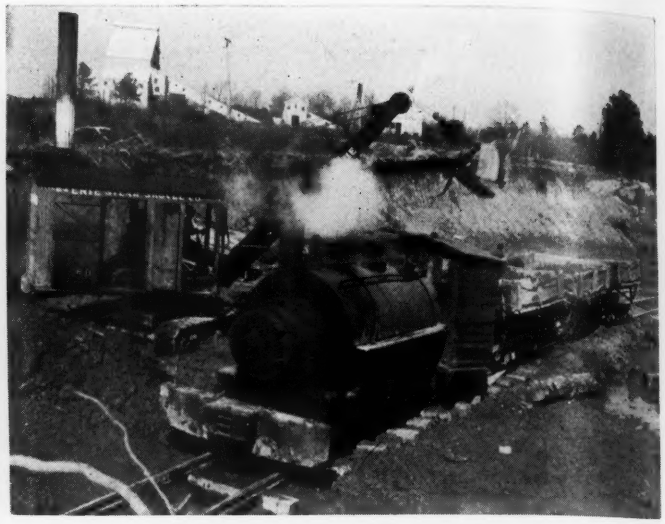
On the same floor as the sizing screens is a large water tank which is used for the water supply of the plant and is set up there to give a sufficient head.

The oversize of the sizing screens is returned to the bin over the two 10-in. crush-



Cross-section elevation of primary and secondary crushing plants

Storage tracks beyond the plant. Fifty empties can be placed on the track



Steam shovel stripping overburden. An average depth of 12 ft. is removed

ers by a horizontal belt 18 in. wide and 56 ft. centers.

The bins below the sizing screens are on concrete piers and the bottom is of concrete but the sides are of steel columns holding wooden planking. There are three bins in a block 48 ft. by 44 ft. and they hold about 12 cars in all. The cars to be filled may be run in on either of the two tracks which pass under the bins. A by-pass parallel track allows either empty or full cars to be sent around the plant. The track system is very well laid out. Storage tracks beyond the plant will hold 50 cars and the grade is sufficient to permit them to run through by gravity. Filled cars run down by gravity to storage from where they are pulled out to the Atlantic Coast main line, about two miles distant. The Southern railroad has its tracks near by and connection may be made with this road at any time. These tracks were used by the old plant which was on this site.

Looking down on the scalping screen from the floor above

The plant is electrically driven from the steam shovel on up. All motors are of Allis-Chalmers make and a list of the principal motors includes:

Machine	Motor
48x60-in. jaw crusher	200 hp.
20 in. gyratory crusher	150 hp.
Each 10-in. reduction crusher	100 hp.
42-in. conveyor	25. hp.
Scalping screen and 36-in. conveyor	50 hp.
Sizing screens and elevator	25 hp.
Hoist for quarry incline	150 hp.
Allis-Chalmers 150 gal. centrifugal pump for water supply	10 hp.

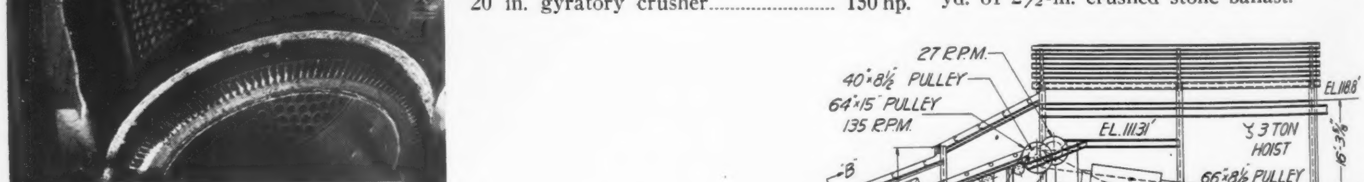
(A duplicate of this set is placed in the quarry)

For supplying air for the X-70 Ingersoll-Rand drills used in block holing, there is an Ingersoll-Rand compressor which furnishes 875 cu. ft. per minute. This also furnishes air for the hoist by which cars are dumped.

All construction is of steel and concrete, the sides of the buildings being of corrugated steel siding.

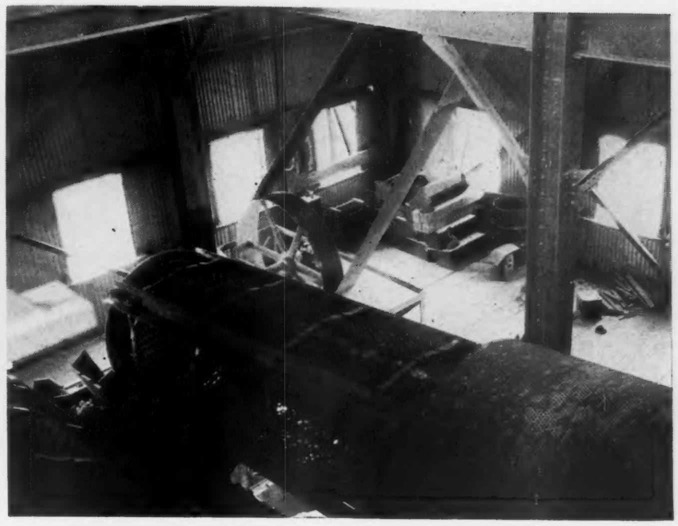
The main office of the plant is in the Boxley Building at Roanoke, where all contracts are made for the various quarries. A. W. Lunsden is general manager and is also general manager of the Pembroke Limestone Corp.

Trego Stone Corp. has a contract with Atlantic Coast Line R. R. for 1,000,000 cu. yd. of 2½-in. crushed stone ballast.



Cross-section elevation of screening plant

Head of 36-in. elevator above the scalping screen



Looking down on the 24 ft. by 60 ft. sizing screen

White Cliffs, Arkansas, Cement Project Revived

ON several occasions within the past few years, there have been rumors circulating concerning the establishment of a cement industry in Arkansas, notably near the limestone deposits at White Cliffs. The quarry operation at that place has been somewhat spotty, long periods of idleness intermingled with some productiveness. A short time ago, it was reported to have passed into the possession of A. B. Banks and associates, who, it is understood, are making plans for its extensive development. These plans include a cement mill of 500,000 bbl. annual capacity, according to the *Little Rock* (Ark.) *Democrat*, from which the following is taken:

"The immediate erection of a cement manufacturing plant of 500,000 bbl. per year capacity at White Cliffs, on Little river, about eight miles north of Ashdown, is now assured, it was announced by A. B. Banks, president of the Lime Products Co. The plant will involve the expenditure of $1,392,000, plans for which have been in process of making by Alfred M. Lund, president of the Lund Engineering Co., and will be completed shortly.

"Plans for the financing of the project also have been completed, Mr. Banks said. In addition to the cement plant, the present plant which manufactures 'whiting,' fertilizer and filler for asphalt will be operated by the company.

"The construction of the plant, which will be more than one-fourth mile in length and consist of several units, will require more than 12 months, Mr. Lund said. A large force of expert construction workers will be employed on the project.

"The officers of the Lime Products Co. are as follows: Mr. Banks, president; Vann Howell of Fordyce, vice president; John R. Hampton and Lawrence Banks of Little Rock, vice-presidents, and J. Hershel Lewis of Little Rock, secretary-treasurer.

"The projected plant will be located on the Graysonia, Nashville & Ashdown railroad, which connects at Nashville with the Missouri Pacific, and at Ashdown with the Kansas City Southern and the Frisco railroads.

"'There will be no holidays for the plant, for it is necessary to keep it in operation 24 hours per day for 365 days in the year,' Mr. Lund explained. 'We probably will use coal as fuel, but possibly there might be changes in plans which will require the use of gas.'

"The plant will manufacture cement and market it under the trade name, 'Arkansas Portland Cement.' The extensive plans which have been formulated by Mr. Lund and which have been confirmed by the engineering firm of Ford, Bacon & Davis of New York, contemplate that the entire output of the plant will be marketed in Arkansas.

"'Because of the excellent location of our plant at White Cliffs, we have preferential freight rates over the largest part of the state, which is a larger market area than that of any other cement manufacturing plant in the eastern part of the country,' Mr. Lund said.

"The recent decision of the supreme court of Arkansas upholding the validity of the Martineau Highway Act, which provides for the issuance of $52,000,000 in bonds for the construction of highways over the state, was one important factor in the decision of Mr. Banks and associates in going ahead immediately with plans for the erection of the plant, it was intimated.

"The value of the present plant of the Lime Products Co., which was acquired last year by Mr. Banks and associates, is approximately $250,000, it was said.

"A new product which will be marketed under the trade name, 'plastite,' which is a by-product of the lime plant and which was discovered and perfected by Mr. Lund, is said to increase the strength of concrete by 40% and to greatly increase the plasticity of concrete"

Rules Against Sand Company

FAILURE of a buyer to take less than the contracted maximum amount of sand per year is no excuse for the producer to attempt to sell direct to the contracting party's customers, is a recent ruling handed down by a Delaware court. This opinion was given by Chancellor Wolcott, overruling the defendant's demurrer and granting a preliminary injunction in the action of William Leslie Cramer of New Castle against the Lewes Sand Co., Lewes, Del.

According to the bill filed in the case some time ago, the company contracted on April 16, 1924, to sell exclusively to W. L. Cramer, for five years, sand for use in the manufacture of castings and in the iron and steel trade generally, but later, because Mr. Cramer purchased much less than the maximum of 100,000 tons a year as stipulated in the agreement, started to sell sand to Mr. Cramer's customers.

The bill asked that the company be enjoined from soliciting business from Mr. Cramer's customers and from selling sand to his customers, and also asked that the company be required to make an accounting for profits for alleged breach of the agreement.

In his opinion, the chancellor states:

"The fact that the complainant has not taken as much sand as the defendant thinks he should have taken cannot justify the defendant in its purpose to embark upon a program of competition. The defendant did not see fit to condition its agreement not to compete upon an obligation on the defendant's part to take a minimum yearly amount of sand. For it to assume to exact such a condition now is to write a new term into the contract.

"On the ground that the complainant is entitled to have his business freed from the competition which the defendant's letter threatens, the bill should be retained and the demurrer overruled."—*Wilmington* (Del.) *Journal.*

Pennsylvania Gypsum Co.'s gypsum tile plant at Chester, Penn.

Making Six-Foot Gypsum Tile

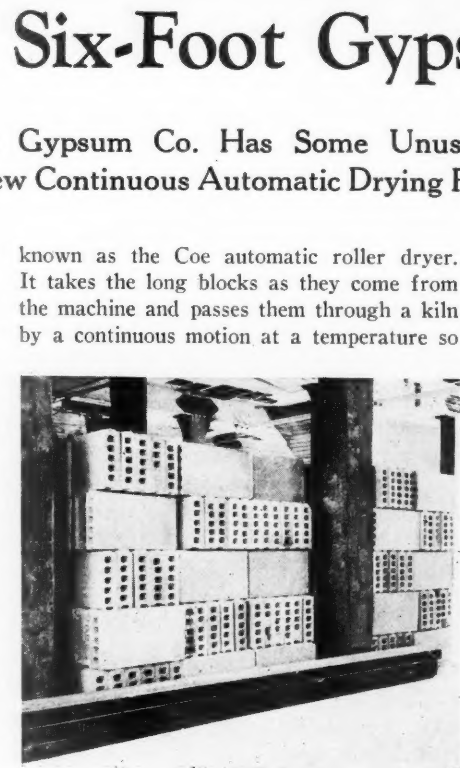
Pennsylvania Gypsum Co. Has Some Unusual Operating Features—New Continuous Automatic Drying Process for Tile

IN common with the other plants of the northern and middle Atlantic coast, the plant of the Pennsylvania Gypsum Co. at Chester, Penn., imports its raw material. The usual supply is from mines at Ingonish, Nova Scotia.

Chester is on the Delaware river between Wilmington and Philadelphia. It is a port of considerable importance. The Pennsylvania Gypsum Co. has its own docks and is building new docks at which vessels of 10,000 tons burden may be unloaded. The plant was originally built by the Keystone Gypsum Co. After this company went out of business the present owner purchased it and remodeled and added to it extensively. Some who are in a position to know say that it is the most modern block plant in the United States, in its equipment and its practice. It manufactures plaster and gypsum blocks, and the equipment for block making and for drying the blocks is at present unique, although the machines used are now on the market and their success in this plant is expected to give them a wide application.

Making 6-Ft. Blocks by Machine

The block machine is the Gibraltar machine developed by the Gypsum Engineering and Manufacturing Co. (designed by C. Payne, the company's vice-president), and its unusual feature is its ability to make blocks or roofing tile 6 ft. in length of a hard, dense gypsum. This quality is attained by careful attention to the water-gypsum ratio and the design of the machine, which permits a mixture of low water content to be used. The dryer is one recently introduced by the Coe Manufacturing Co. and is known as the Coe automatic roller dryer. It takes the long blocks as they come from the machine and passes them through a kiln by a continuous motion at a temperature so high that they are sufficiently dried in only three hours.



Pile of finished tile in storage

Both block machine and dryer will be described in greater detail farther on in this article. As for the remainder of the plant, practice does not vary much from the standard, except perhaps in the size of some of the units. The gypsum rock received from Nova Scotia has been crushed so everything passes a 3-in. ring before being loaded on the ship.

Drying and Calcining Equipment

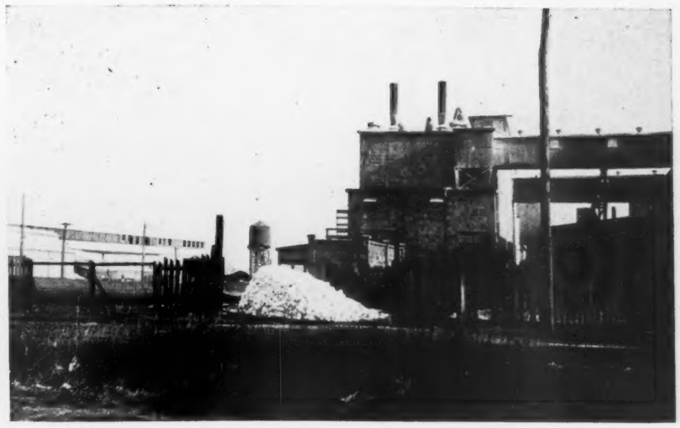
The gypsum rock dryer, which is about 50 ft. long and 8 ft. in diameter, is one which was in the plant before it was remodeled, and is said to have been built at the plant. It is fired with coke and is of the direct-heat cylindrical type, the gypsum falling through the current of heated air and gas which passes to the stack.

The dried gypsum rock is crushed and pulverized in a Pennsylvania hammer mill, which is driven by a 125-hp. General Electric motor, and screened over a Link-Belt vibrating screen. This reduces the rock sufficiently fine for calcining. This practice varies from that observed in other gypsum plants, but it is the same as in use at the plants of the Ontario Gypsum Co. It would seem to simplify the plant considerably by having all the crushing before calcining done in a single unit of this kind.

The ground gypsum is elevated to the "land plaster" bins, which are of steel plate and of the parabolic type. These hold 200 tons. From these bins the ground gypsum rock is fed to the calcining kettles, two in number, which were built by the company from its own designs. They are unusually large, as they each hold 18 tons and are about 35 ft. high. Oil is used for firing and each kettle has four flues through which the hot gases pass. The bottoms of the kettles are of steel plate.

The hot pits into which the kettles are discharged are inverted cones, the sides sloping at about 50 deg. Each cone terminates in a neck which leads into a closed screw conveyor which delivers to another screw conveyor discharging into the boot of the hot elevator. This hot pit system requires fewer conveyors than the more usual type, and the writer was told that it was very satisfactory in practice. The hot calcined gypsum flows freely and never hangs up on the sides of the cones; and the delivery to the elevator is therefore uniform in quantity.

Office and plaster and block plant



Grinding and calcining departments

From the hot elevator the calcined gypsum is sent to bins from which it is fed to the regrinding machines. There are two 5-ft. Raymond mills of the low-side type and one Raymond pulverizer. The mills are fitted with the Raymond automatic feeding device. The pulverizer handles the rejects from the Raymond air separation system, which is of the type regularly installed with this design of mill.

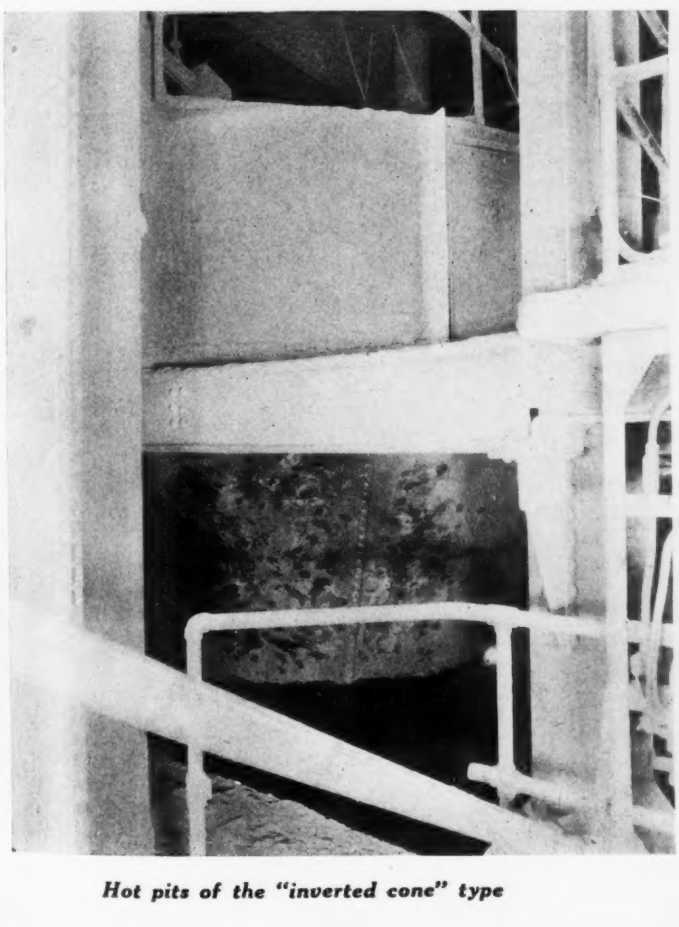
Block Manufacture

The ground gypsum stucco is now ready to be made into plaster, gypsum block or tile. Since the block and tile manufacture is the unique part of the practice at this plant, the following description will be confined to it.

The machine and all its accessories, such as the mixer and feeder, was designed by the Gypsum Engineering and Manufacturing Co., Chicago, and the idea in mind throughout the process was to keep the water content of the mixture at such a point that a firm and strong block would result. As with portland cement, the strength of gypsum, after it has set, is largely dependent on the water ratio, any water in excess of the requirements for hydration weakening the structure by the formation of minute water voids.

The gypsum is fed from a hopper on a 54-in. conveyor belt, and in feeding it passes through the teeth of a comb so that it is distributed evenly across the belt. The belt is not only troughed in the usual way but it is sagged in the center so that it will hold a shallow pool of water. The water is kept at a constant level on the belt by a small "steady head" tank, provided with a float valve, which is set to one side of the belt. As the belt moves while the water stands still (or flows back at the same rate the belt goes forward), the gypsum on the belt is drawn through the water, taking up about the right amount of water for hydration as it goes.

The stucco to be mixed is supplied to the soak belt, in regular and uniform quantities, by a Gibraltar stucco feeder. The stucco is then soaked by running the belt with stucco on the upper surface under the bath of water, taking up its needed water as it travels under the bath, and as the belt rises out of the water with stucco on its

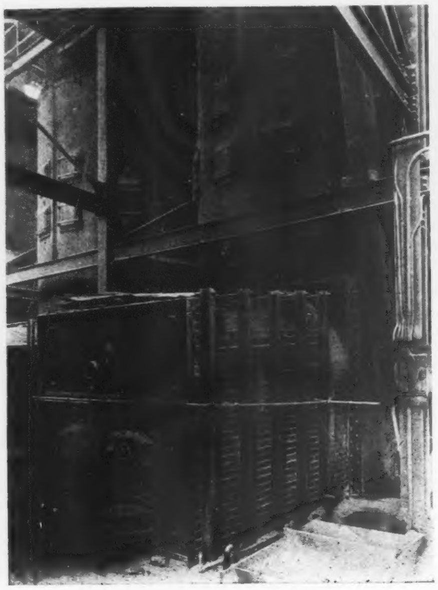


Hot pits of the "inverted cone" type

Hammer mill where rock is reduced to calcining size

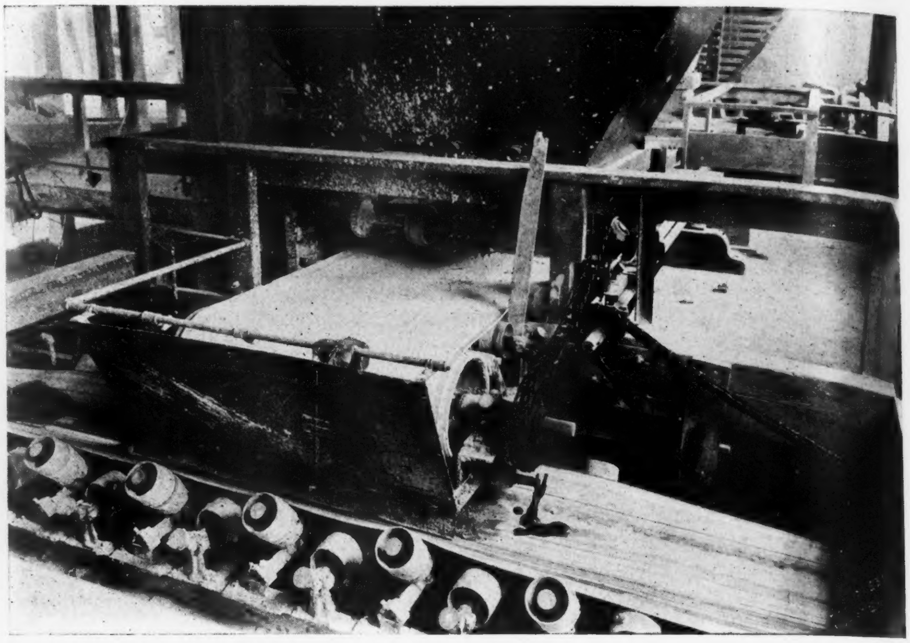
upper surface, dry wood fiber is automatically fed to the mix together with a sufficient quantity of accelerator. This soaked stucco then travels on a cross belt and is dumped into a Gibraltar continuous mixer.

This is known as a self-cleaning continuous mixer, and is strongly built, consisting of a vertical cast-iron frame, in which all transmission gears are fitted, to produce the necessary speed of the respective paddles. Upon



Oil-fired gypsum kettle

the cast-iron base is fitted a cast-iron cylinder which has a phosphorous bronze removable liner. The bronze piston, forming into the bottom of the cylinder, is attached to a steel rack operated with a steel pinion attached to a hand wheel, for the purpose of raising and lowering the piston and paddles when emptying and cleaning the mixer. The piston is generally set about 12 in. from the mouth of the discharge opening, and the phosphorous bronze paddles rotate in oppo-



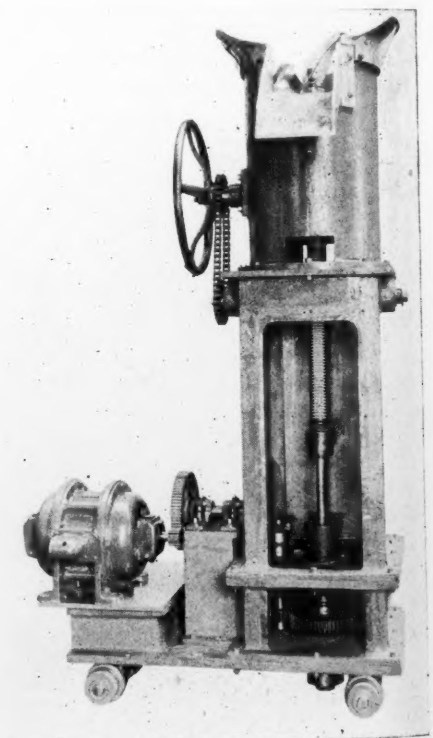
Rear of soak belt showing stucco, fiber and accelerator feeders

site directions. The design of paddle is such that they clean one another, also the walls of cylinder.

The soaked material is dumped into this cylinder from the soak belt, previously mentioned, on the outside of the vertical shaft, and the action of the paddles, revolving at a high speed, beats the material to a creamy consistency and forms a continuous discharge of the mixed material flowing through the aluminum spout into the machine.

The block machine is circular, about 15 ft. in diameter and 15 ft. high. This height is necessary to make the 6-ft. block or tile, which are used in this length as roofing tile. The cores, which pass through the full length, have to be drawn an equal distance below, and space has to be added for the device that cleans the cores.

The exterior circle consists of 20 units of two molds per unit. Within this circle is the drive, and the mechanisms for giving the various movements to the different parts of the machine. The supporting framework of the machine is of heavy section cast-iron. All gears are of steel. The various parts



Self-cleaning continuous mixer

of the mold are of machined cast-iron faced with aluminum plates 5/16 in. thick. This is so only the aluminum surfaces can come in contact with the gypsum. The side doors and the dividing plates of the molds are made with both plain and grooved faces which can be reversed to make either plain surfaces or tongue-and-groove surfaces on the

Soak belt showing hopper and stucco comb

blocks as desired. At present only the tongue-and-groove blocks are being made.

The cores are of brass and each set is assembled on a plate which has side bearings working on vertical guides. This keeps the cores in alignment with the mold.

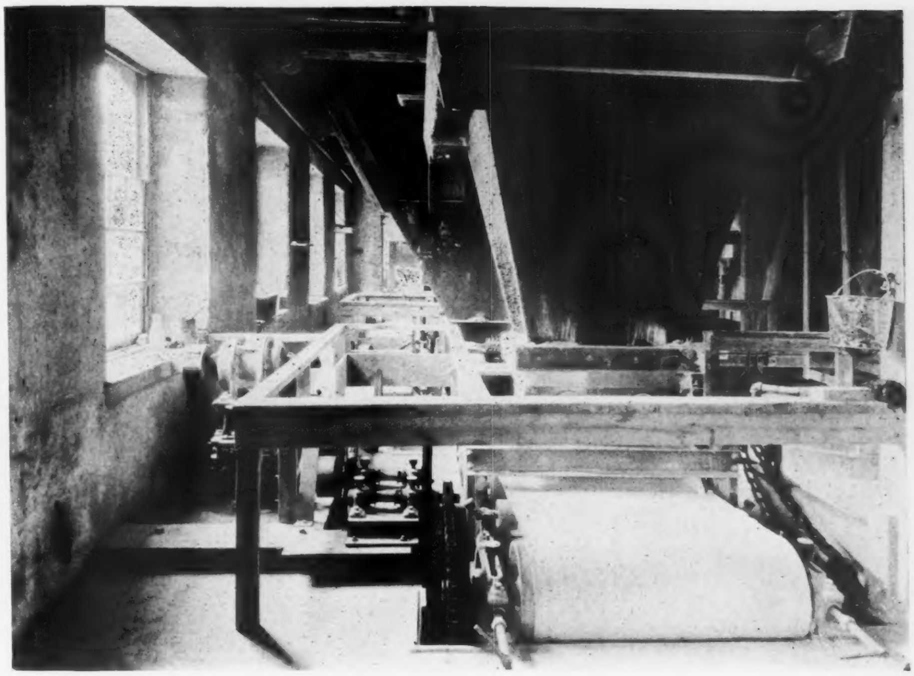
The top of the machine is made up of heavy brass plates running from opening to opening so as to form a continuous surface. This allows the surplus of material which is left after one mold has been filled to be pushed into the mold following.

Cycle of Operation

The operation, briefly, is as follows: The gypsum mixture flows into the mold beneath the mouth of the mixer and during the time the mold is filling the cores are rising, being pushed up into the mixture from below. The excess mixture is pushed over into the next mold as the machine revolves, and this mold is filled, the gypsum-fiber mixture running continually from the mixer. The filled mold with the cores in position travels slowly for four units distance (one-fifth of the circle). When this point has been reached the gypsum has its initial set and the cores may be withdrawn without danger of the block collapsing. As the cores are pulled down they trowel the interior surfaces and withdraw some surplus water. They pass from the molds through a cleaning device and an oil box. On their return, before they are pushed up into the next block, they are sprayed with atomized oil, which keeps them clean and in perfect condition to enter and leave the plaster without sticking.

After the cores are withdrawn the mold containing the block travels to a point halfway around the circle, while the setting goes on. At this point the side doors are opened, allowing air to enter and assist in the hydration. Then it goes a distance of two more units and here the blocks are ejected, coming out on the front door of the mold, which falls to a horizontal position, a compressed air device preventing shock. The blocks are slid off at this point (by hand) and fed to the block machine by a semi-automatic feeder described further on in this article.

After the blocks have been ejected, the front and side doors of the mold are automatically closed and sprayed with vaporized oil. The mold travel places it under the mouth of the mixer and ready to be filled.



Showing the drives on the soak belt and feeders

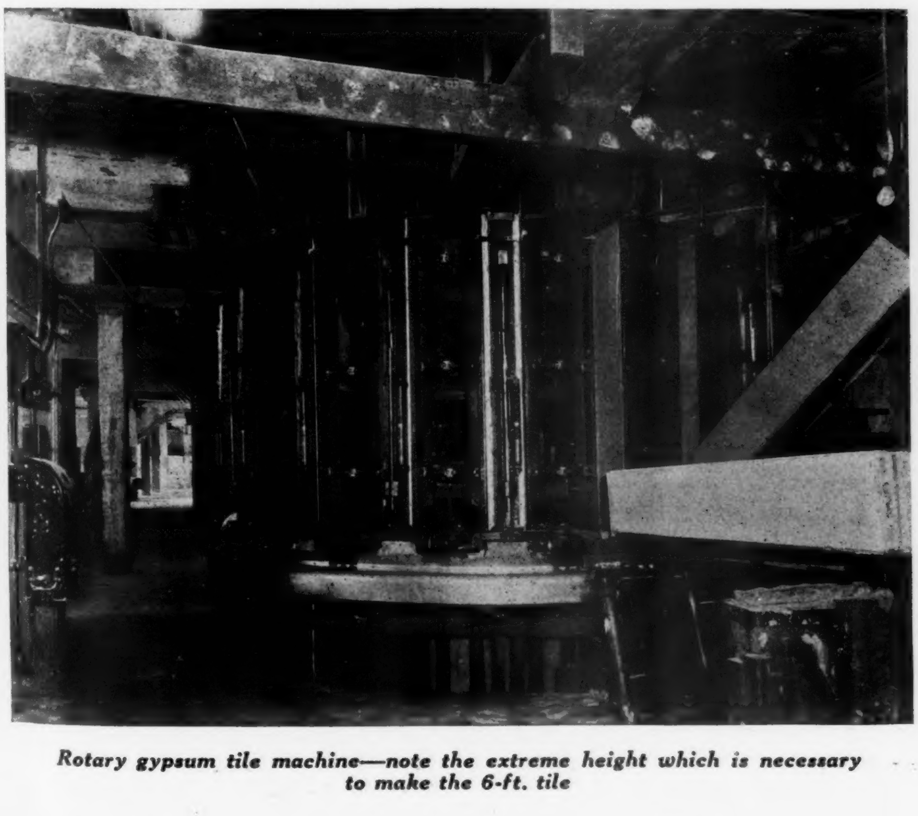
"Gypsum Lumber" Manufacture Possible

The blocks which were being made when the plant was visited were 6 ft. long and of the tongue-and-groove type, afterward sawed to make three 2-ft. blocks. But the machine is not confined to this length or this type of block. Any length from 4 to 6 ft. of reinforced roofing tile can be made on this machine. Solid or hollow partition tile can be made in 3-in., 4-in. or 6-in. thicknesses, as well as a 3-in. reinforced roofing tile. A somewhat new product, but one which is rapidly coming into favor, is gypsum lumber, and this may be made in 6-ft. lengths. Adjustments permit the manufacture of products of different types at each revolution. It can make more than one kind of block, or block and tile, in the same cycle.

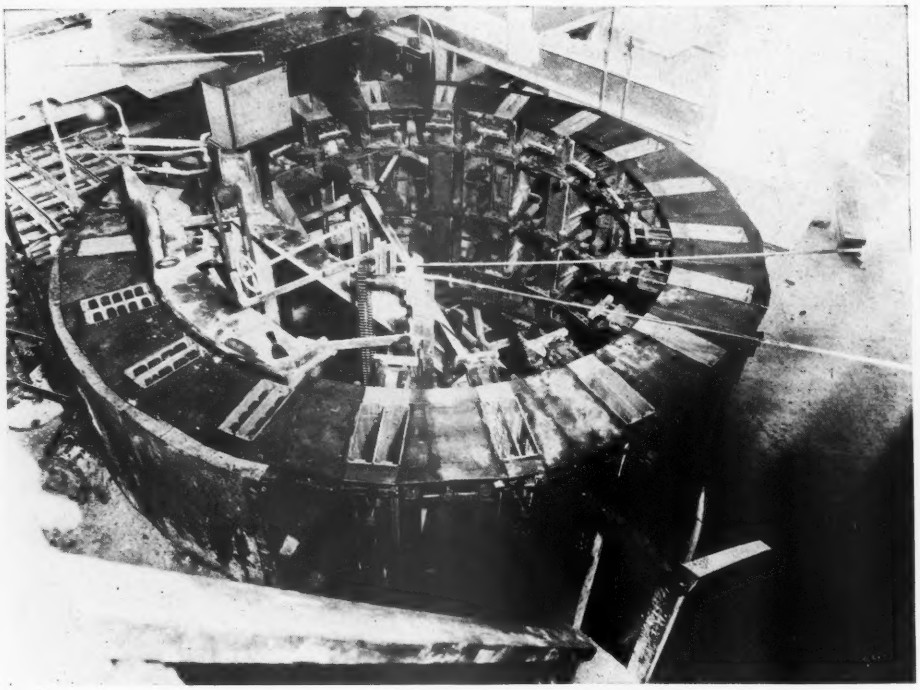
An advantage of the tongue-and-groove block or tile is that it may be laid without mortar. The edges are dipped into a "slip" of gypsum and water and then set in place. Tests on wall laid in this way, according to the Gypsum Engineering and Manufacturing Co., have shown the joint to be strong, as the walls tested broke through the core holes.

As the blocks are taken off of the block machine by hand they are not touched again by hand until they are taken from the conveying belt and piled for storage or loaded directly on freight cars. The handling and drying of these blocks in a continuous manner is accomplished as follows:

Running past the point at which the blocks are taken from the block machine is a small car or truck operating on a track. Mounted upon the top of this truck are rollers. When the block is taken from the block machine it is pushed on these rollers and the car then travels a little more than



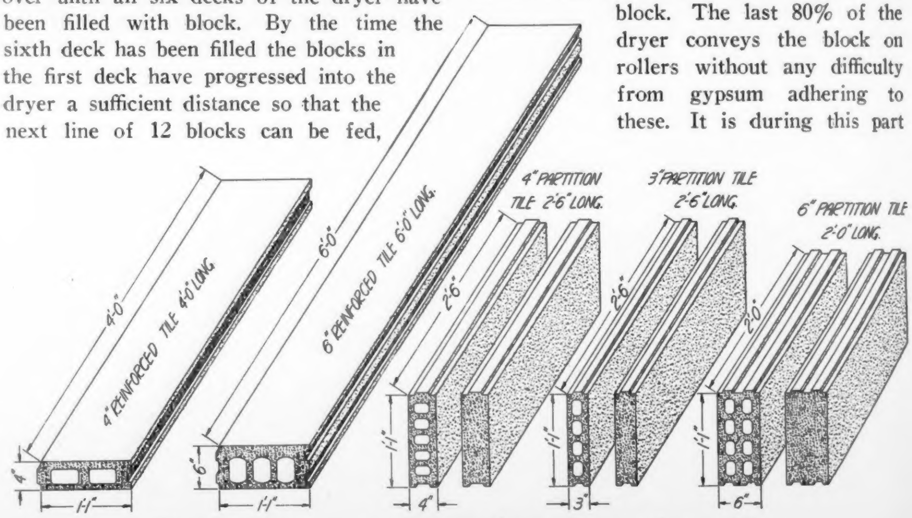
Rotary gypsum tile machine—note the extreme height which is necessary to make the 6-ft. tile



Looking down on the automatic block machine

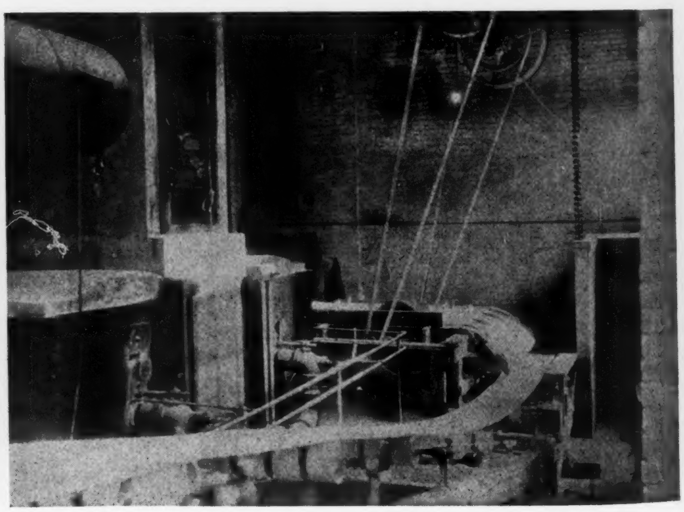
the distance of the width of one more block and the next block is laid on the rollers alongside of the previous block. This operation is kept up until the car has 12 blocks in a row lying on their side. The car during its travel has been gradually going on to the platform of an elevator, and when the last block is on the car the elevator rises to any one of the six decks of the Coe continuous roller block dryer. The car is started by a push button and stops automatically at any deck desired. When the elevator has stopped the blocks are pushed automatically into a deck of the dryer at a fast speed and the elevator returns and the car is driven off of the elevator back to a position in front of the delivery point of the block machine, and is now ready to be loaded again with 12 blocks as they come from the block machine, and the operation of feeding in this way is repeated over and over until all six decks of the dryer have been filled with block. By the time the sixth deck has been filled the blocks in the first deck have progressed into the dryer a sufficient distance so that the next line of 12 blocks can be fed, and the dryer is thus kept continuously fed with blocks. The advantage of this feeding operation is that the operator only has to push a set of buttons without leaving his position at the take-off of the block machine and the feeding operation is taken care of automatically.

The dryer itself is capable of taking 12 blocks wide and has a width inside of over 17 ft. Its overall height is about 9 ft. and its total length, including the feeding elevator and the discharge elevator, is approximately 90 ft. Its capacity is based at the rate of 600 hollow blocks per hour, 3 in. thick, 12 in. wide by 30 in. long, but it is actually drying blocks of thickness up to 6⅜ in. by 13 in. wide by 6 ft. long. The blocks are conveyed through the first 20% of the length of the dryer on woven wire belts of spring steel, and during this period are heated and humidified at a comparatively low temperature. The wire belts are used instead of rollers at the beginning of the process to give the surface of the block time to sufficiently harden so that the gypsum will not build up on the rollers which are used later in the dryer. At this stage of the drying it is necessary that the air be somewhat humid to precondition the block. The last 80% of the dryer conveys the block on rollers without any difficulty from gypsum adhering to these. It is during this part



The different types of gypsum block made on the machine

Saw table where blocks are cut to desired lengths

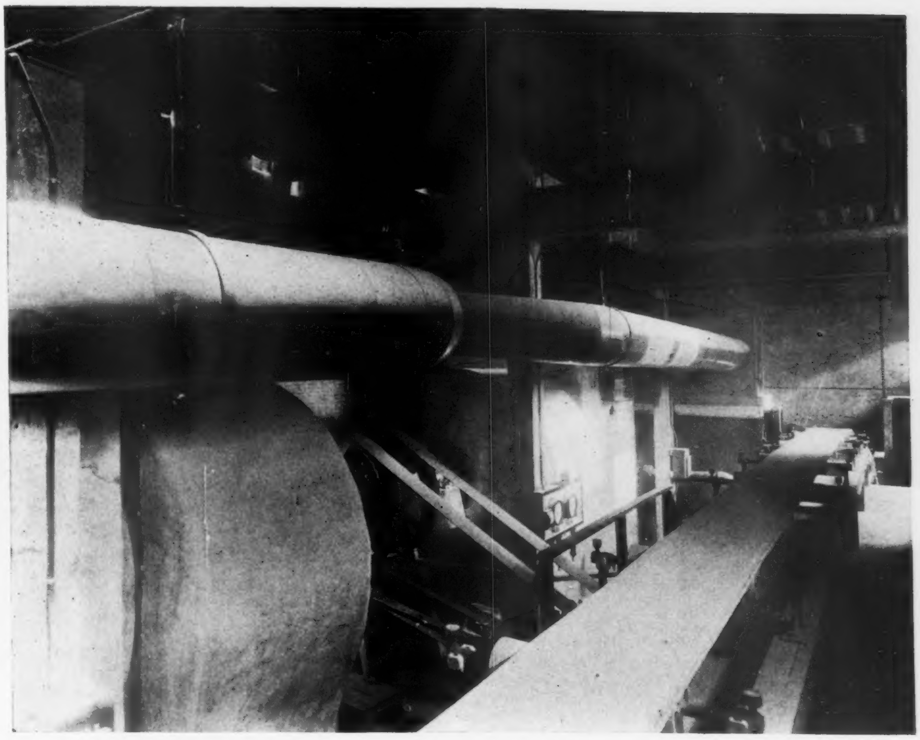


Circular saw and belt on which the sawed block are taken to storage

of the drying that conditions are applied which have hitherto been a failure when applied to tunnel kilns. The temperature in the first half of this latter 80% of the drying is carried on at 400-deg. F., and on the last half at 225-deg. F. By this process of first conditioning and then drying at temperatures high enough to calcine the surface of the block in a tunnel kiln it is possible to dry the 3 in. thick hollow blocks in less than three hours, instead of the usual 18 to 20 hours, necessary in the conventional tunnel kilns. The blocks are not calcined nor discolored, even in the slightest degree. The ends of the dryer are entirely open and one can look from one end of the dryer through to the other, and there are no obstructions excepting the blocks moving through. The ducts and air circulation system inside of the dryer itself were designed by the Coe Manufacturing Co. on a new system of balanced draft, which has worked out according to expectations so that there is no leakage of air from the open ends.

As the blocks are fed into the dryer in rows, naturally they also come out of the dryer in rows, and an unloading elevator worked by an automatic push button control handles a row of blocks at a time from each of the decks of the dryer and deposits the entire row of blocks on cross belts located at the lowest travel of the elevator. These cross belts take the block to gravity rolls, which deliver them to the saws, where they are cut to length.

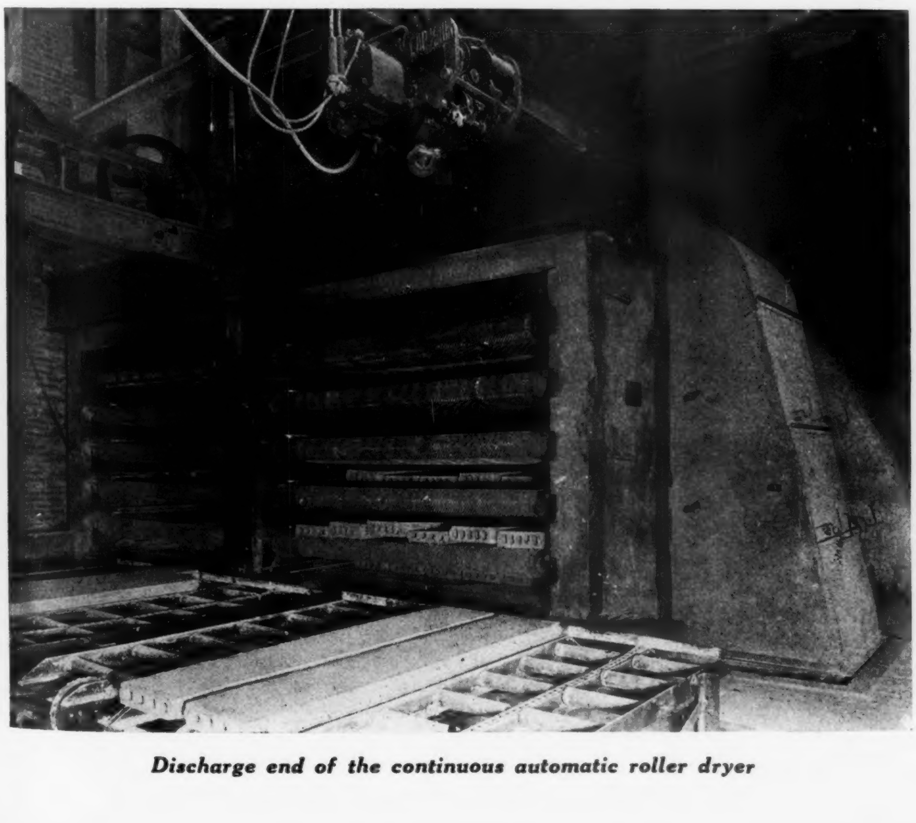
The saws are ordinary circular saws set in a frame so as to cut the block in three 2-ft. pieces. Each piece, which is then a partition block, falls on an 18-in. belt conveyor 120 ft. long and is carried by the belt to storage or to be loaded directly on cars. The large building has ample storage capacity to carry a stock of various kinds of products as the demand requires.



Dryer fans and ducts. The belt carries the dried block to the saw at the far end

The block dryer is fired with oil (the burners are designed and installed by the Drying Systems, Inc., Chicago) and this part of the drying process is one of the most interesting features of the plant. The oil flame is adjusted to forestall danger of smoking, and the temperature is regulated by a ventilating system. The circulating air passes into a brick checker work above the furnaces through which the hot gases from the oil flame also pass. The heated air is then circulated through the decks of the dryer by a large fan and a certain amount is taken out each time by a fan which exhausts into the outside air. This prevents moisture accumulating in the circulating air.

The circulation of the air conserves heat and renders the consumption of fuel much less than it would be if the heated air was merely drawn or blown through the dryer. The re-use of some of the heated moist air also tempers the heat of the dryer and prevents any recalcination of the blocks. The principle is similar to the well-known Coe dryer for wall board and plaster board, which is made by the same company.



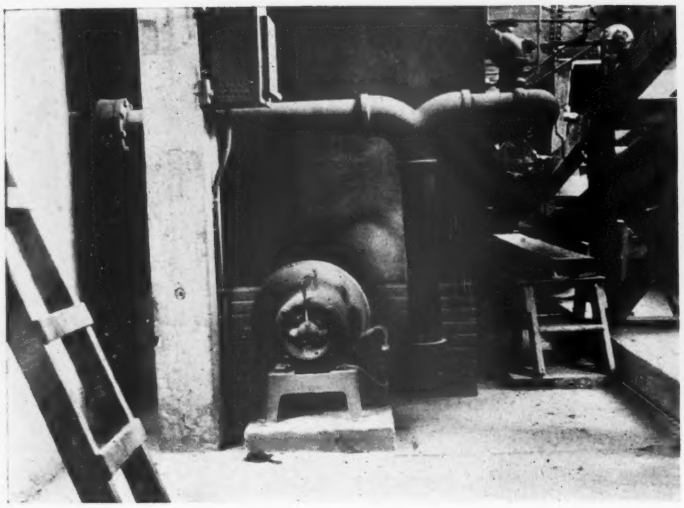
Discharge end of the continuous automatic roller dryer

Automatic Control

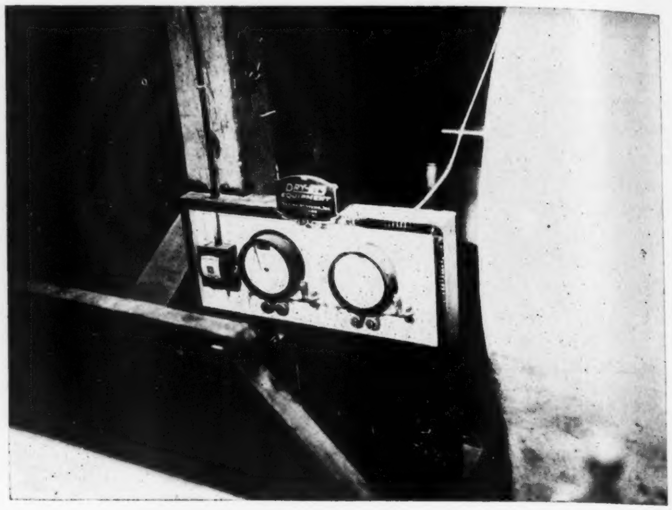
Recording thermometers show the temperatures at all times. By the regulation of both the temperature and the moisture content of the circulating air, the conditions in the dryer are kept uniform regardless of outside conditions of heat and moisture. And of course this uniform condition has an important effect on the quality of the product.

Each drying zone has its furnaces, fan for circulating the air, and recording instruments. The fans, all the ducts leading into and out of the dryer, and the dryer itself are all covered with an insulating compound of magnesia and asbestos to prevent losses by the radiation of heat. Each fan is driven by a 75-hp. Allis-Chalmers motor.

Blocks are handled to storage by racks and a lift truck. Each skid holds 100 of the 2-ft. blocks and is run to whatever part



Oil burners and furnace for the dryer



Recording thermometers on the dryer

of the floor it is desired to pile upon. Where blocks are to be loaded directly on the cars they are taken from the belt and run into the cars on a roller conveyor. The plant is on two railroads, the Reading and the Pennsylvania, which afford it shipping facilities to practically any market within a reasonable shipping radius.

The office of the Pennsylvania Gypsum Co. is at 1609 Franklin Trust Bldg., Philadelphia, Penn. S. A. Stephens is vice president and general manager. F. Andrews is the assistant manager, and J. H. Robinson is superintendent.

Production of Magnesite in 1926

THE production of crude magnesite in the United States in 1926 was 133,500 short tons, valued at $1,200,830, according to statistics compiled by J. M. Hill, of the Bureau of Mines, Department of Commerce. Four operators at 5 mines in 4 counties in California produced 53,940 tons of crude magnesite, valued at $604,130; all of them reported only fair business due to foreign competition and lower prices on all products. All of the output in Washington was from the mines of the Northwest Magnesite Co., which operated 2 of its 6 furnaces at Chewelah, Stevens County, part of the year.

MAGNESITE SUPPLY IN THE UNITED STATES, 1921-1926, EXPRESSED AS CRUDE MAGNESITE, IN SHORT TONS

Year	Domestic	Imported	Total*
1921	47,904	65,569	113,473
1922	55,790	217,861	273,651
1923	147,250	151,092	298,342
1924	120,100	148,700	268,800
1925	120,660	142,283	262,943
1926	133,500	196,318	329,818

*Prior to 1924 a factor of 2 tons of crude to 1 ton of calcined was used in expressing imports as crude magnesite. Since 1924 the factors used are 2 to 1 for imports from Italy and 2½ to 1 for other imports.

Sales of magnesite of domestic origin in 1926 were 1,540 tons crude, 18,580 tons of caustic calcined (a decrease of approximately 22% as compared with 1925), and 42,540 tons of dead-burned (an increase of 46% as compared with 1925), having a total value of $1,703,490.

Imports of magnesite in 1926, according to Bureau of Foreign and Domestic Commerce, were 608 short tons crude, valued at $6,555; 14,830 tons of caustic calcined, valued at $330,131, over half of which came from India; and 77,108 tons of dead-burned, valued at $1,128,823, practically all of which was from Italy. Corresponding figures for 1925 were 4,478 tons crude, valued at $57,185, most of which came from Italy, 17,019 tons of caustic calcined, valued at $412,186, nearly 60% of which came from India, and 47,620 tons of dead-burned, valued at $703,273, over 99% of which was from Italy. It is interesting to note that a few tons of crude and caustic calcined magnesite was imported from Kwantung, China, in 1926.

Prices

Quotations† on crude magnesite during 1926 were $14 a ton. California Grade A, caustic calcined, ground 80% through 200-mesh, was quoted at $40 to $42 a ton in January and February, $38 to $42 in March and April, $45 in May, $40 in June and July, $44 in August and September, $45 in October, $42.50 in November, and $40 in December; the Grade B was $38 throughout the year. Dead-burned was $40 a ton at the first of the year, but from February to August was quoted at $35, and since September at $33 a ton eastern seaboard.

Domestic producers reported sales of crude magnesite at from $7.50 to $12.65 a ton, f.o.b. shipping point of mine, the average price for all magnesite sold crude being $11.32 a ton. Producers of caustic calcined magnesite in the United States reported sales at from $20 to $40 a ton, the average price for the total sales of domestic being $32.10 a ton. Domestic dead-burned magnesite was sold at $25 to $46 a ton, the average price for the entire output being $25.62 a ton, f.o.b. shipping point.

†*Engineering and Mining Journal*, vol. 121, 1926; vol. 122, 1926.

Stocks

Producers reported stocks of 4,340 tons of crude magnesite at plants on December 31, 1926.

Heat Insulation Materials

J. S. F. GARD, writing in the *Journal of Society of Chemical Industry*, discusses the qualities required for a good insulating material. These, he says, are as follows: Low heat conductivity, low specific heat, low specific gravity, sufficient mechanical strength to withstand vibration and accidental knocks, non-inflammability, non-corrosive action on metals, and ability to withstand alternate wetting and drying and heating and cooling with no tendency to crack.

The most efficient material for furnace work, confirmed by an extensive series of tests, has been found to be a honeycombed brick, the main constituent of which is kieselguhr. This brick has a low density and considerable mechanical strength, and when built into the furnace becomes an integral part of it. The insulating effect is due to the minute air cells of the kieselguhr coupled with the air pockets of the honeycomb structure.

The best material for a superheated steam plant, temperatures from 700 to 1000 deg. F., is considered to be a covering consisting essentially of basic magnesium carbonate with asbestos fiber to act as a binder. A sufficient layer of this is laid down to break down the temperature to 700 deg. F., the limit of decomposition for the magnesium carbonate. The layer is further increased by the addition of sufficient 85% magnesia and 15% asbestos fibre composition to give the desired thickness.

DOMESTIC SUPPLY OF MAGNESITE IN VARIOUS FORMS IN 1926

Class	Sales (domestic) Short tons	Sales (domestic) Value	Imports Short tons	Imports Value	Total Short tons	Total Value
Crude	1,540	$ 17,440	608	$ 6,555	2,148	$ 23,995
Caustic	18,580	596,370	14,830	330,131	33,410	926,501
Dead-burned	42,540	1,089,680	77,108	1,128,823	119,648	2,218,503

New Plant of the Yosemite Portland Cement Corporation, at Merced, California

An Unusual Quarry Operation and Some Special Plant Details

By W. C. Stevenson
Stevenson Engineering Corp., Hobart Bldg

THE new plant of the Yosemite Portland Cement Corporation will begin operations about June 15. It is located two miles north of the city of Merced, in the heart of the great San Joaquin valley, and is to be served by the Southern Pacific, Santa Fe and Yosemite Valley railroads.

The San Joaquin valley is the largest and most fertile agricultural district in California, extending from the Tehachapi mountains northward to Stockton, a distance of about 250 miles. It lies between the Sierra Nevada mountains and the Coast Range, and this width is uniformly about 60 miles.

The Sierra Nevada mountains contain many water sheds, and it is on the rivers in these mountains that many large water power developments have been completed and many others are contemplated. The principal rivers furnishing water for these developments are the Kern, Kaweah, Kings, San Joaquin, Merced and Stanislaus.

There is a large amount of cement used in this district for hydro-electric and irrigation development, highways, ditches, water pipes and buildings. The nearest cement plants to the San Joaquin valley are located south of the Tehachapi mountains, in the San Francisco Bay region and the new Calaveras plant in the Sacramento valley.

General view of the quarry showing the Merced river, railroad, incline roadway and boarding house. The limestone deposit appears up the canyon, at the right

In order to supply the cement needs of the valley and minimize the long freight haul, the Yosemite Portland Cement Company was formed several years ago. This company was unable to finance the plant. A. Emory Wishon, vice-president and general manager of the San Joaquin Light and Power Corporation, knew the conditions and needs and purchased the holdings and equipment from the original owners. He then formed the Yosemite Portland Cement Corporation and built an entirely new and modern cement plant.

Trestle for incline railroad. The limestone deposit is at the left of the canyon

Quarry

The limestone quarry is located about 11 miles below the wonderful Yosemite valley in the Sierra Nevada mountains, on the bank of the Merced river. Running along the Merced river is the Yosemite Valley railroad, and it is this road that will deliver the rock to the plant.

The limestone ledge lies north and south, and has a dip of 85 deg. to the east. It outcrops above the hill for a distance of half a mile, rising above the contact wall several hundred feet. Practically no stripping nor waste are encountered. The quarry floor will be level and will extend the full length of the outcropping. The dip of the deposit

being toward the floor makes a splendid operating condition.

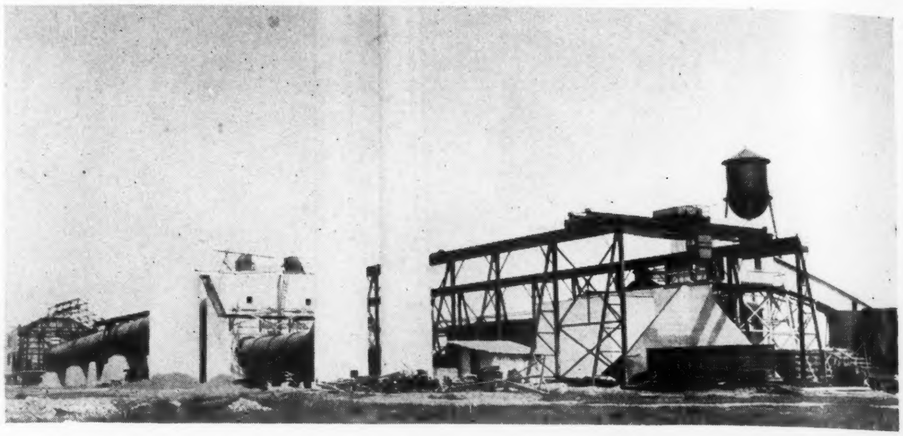
At the start, drilling will be done by jack-hammer drills with air furnished by two 600 C.F.M. Ingersoll-Rand compressors. A 1¼-yd. Marion electric shovel will load the rock into 6-yd. broad-gauge quarry cars, which are operated by a 14-ton gasoline locomotive.

The crushing plant is located about 2000 ft. from the quarry on a steep side hill. The primary crusher, a 30-in. gyratory, receives its feed direct from the quarry cars and discharges into a 12-ft. Sheridan grizzley. This preliminary crusher will reduce to a 6-in. size, and the grizzley has openings 1 in. in width. The grizzley acts as a feeder for the Williams No. 6 heavy type Jumbo hammer-mill crusher. This crusher is set so as to deliver rock not larger than 1 in. The discharge from the grizzley and also from the Williams crusher is fed to a 24-in. rubber belt conveyor, which conveys all the rock into a 600-ton storage bin. Due to the side hill slope the storage bin is loaded without the necessity of distributing conveyors or chutes.

All machinery foundations are of concrete, but the storage bin is of timber construction.

The crushing plant is 800 ft. higher in elevation than the Yosemite Valley railroad, and in order to convey the crushed material from the bin to the railroad a double-track, balanced, inclined hoistway is installed. This electrically driven hoist is placed above the bin. A 1⅜-in. steel cable winds around the two 10-ft. diameter grooved winding drums, and the two ends are attached to the incline cars, one on each track.

The incline hoist was manufactured by the Wellman-Seaver-Morgan Co., and is operated by compressed air, and driven by a direct-connected electric motor. The compressed air is furnished by a compressor driven from the hoist. This driving of the air compressor as well as the generation of electric power, using the driving motor as a generator, materially reduces the duty of the post brakes, which are water cooled.



General view of the mill from the north. Note the buttress wall partition between the limestone and clay supply

The incline cars have a capacity of 20 tons and a speed of 500 ft. per minute. The grade profile is 38 deg. down from the crushing plant for about 1000 ft., and then changes to a 10% grade for about 1000 ft. to the lower terminal. Here the rock is automatically dumped into a 300-ton bin for loading into railroad cars for shipment.

Supplies for the quarry must be taken up hill on the incline. In order to handle these and also serve the crushing plant a stiff-leg derrick is so placed that all parts can be reached. This derrick is of structural steel, has an 80-ft. boom and a lifting capacity of 20 tons. The crushers and hoist were installed with the derrick, and in operation it will serve for repairs and general service. Supplies brought up the incline will be lifted by the derrick directly from the incline track to the quarry track.

A boarding house and sleeping quarters have been supplied at the lower terminal adjacent to the Merced river. All cooking is done on electric ranges and an automatic, electric, water-heater supplies hot water for washing and bathing.

Clay Supply

Clay deposits are found on the property near Merced but because the company policy is to manufacture a high grade product it was decided to get clay from the Ione district, in addition to the local material. A section of land was purchased which contains many acres of clay having the following analysis, on the ignited basis:

SiO_2	59.97%
Fe_2O_3	2.89%
Al_2O_3	35.91%
CaO	0.68%
MgO	0.45%

This material will be loaded into trucks by means of team-drawn scrapers and then shipped by railroad to the plant. It will arrive at the plant on the same track as the limestone and will be unloaded in a similar manner.

Plant Details

The plant site was selected with reference to the distribution of the finished material rather than with reference to the raw materials. This property contains 147 acres of land and is served by three railroads as given above.

All layouts and installations have been made so as to allow of easy expansion. The entire plant can be doubled in size without interference to operation and at a minimum cost. The present installed capacity of 2500 bbl. per day will be inadequate in a few years and the management, realizing this, has taken all precautions necessary to insure a capacity output of the plant sufficient to satisfy the needs of its territory.

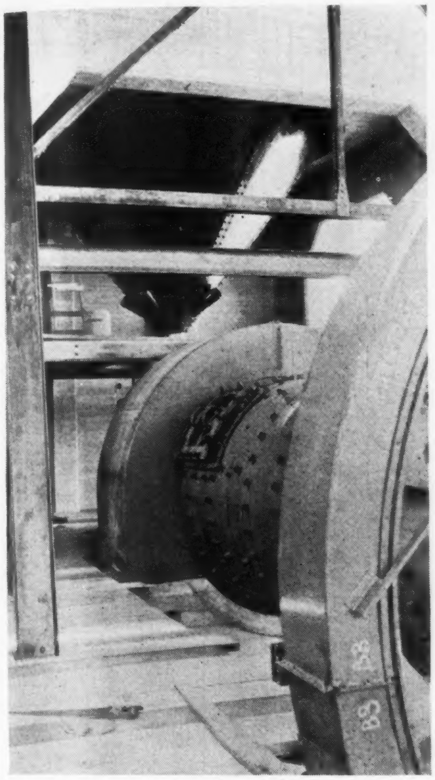
Unloading Raw Materials

Raw materials will be brought in on tracks running parallel to the lengthwise

Raw mill bin and retaining wall, showing the belt conveyor connection

dimension of the mill. This track is elevated so as to give a dumping pit under the cars without an underground pit. From this pit the rock and clay are conveyed by a 24-in. rubber belt conveyor up an incline to the point of discharge. A cross belt conveyor will take the rock from the incline belt conveyor and deliver it into the grinding mill feed bins. Any surplus of raw material will be discharged directly from the incline conveyor behind a reinforced concrete retaining wall for storage.

Clay will be discharged behind the re-



Interior view showing grinding mill and feed bin. Note the poke holes in the cone bottom of the bin

taining wall in the same manner as the limestone. A buttress of the retaining wall acts as a partition between clay and limestone.

From this pile the clay will be handled entirely by the bridge crane either into storage or into the wash mill. The 26-ft. wash

Showing the forms for the wash mill (right of craneway) and steel tanks for the clay slurry

mill will deliver the slurry into centrifugal pumps and thence into steel slurry tanks. A pump maintains a constant stream of slurry passing from the clay slurry tanks to the feed end of the grinding mill, and the amount fed into the grinding mill is regulated by pipe openings. This circulating stream discharges the excess back into the top of the tank and the constant pressure maintained at the grinding mills insures a uniform feed into the mills.

The bridge crane which runs through the center of the plant serves all departments. It is 70 ft. wide, 580 ft. long, and has a 30-ft. clearance under the bucket. The supporting structure is of steel. The crane has a 10-ton lifting capacity, a bridge traveling speed of 500 ft. per minute, and carries a 3-yd. clamshell bucket. In the craneway there is a storage capacity sufficient to operate the mill six months on clay, thirty days on limestone, thirty days on clinker and ninety days on gypsum.

Feed Bins and Raw Grinding Department

Each of the grinding departments has feed bins of reinforced-concrete construction. For the raw grinding department the bin is divided into two compartments, while in the clinker grinding department the bin is divided into three compartments, one of which is used for holding the gypsum.

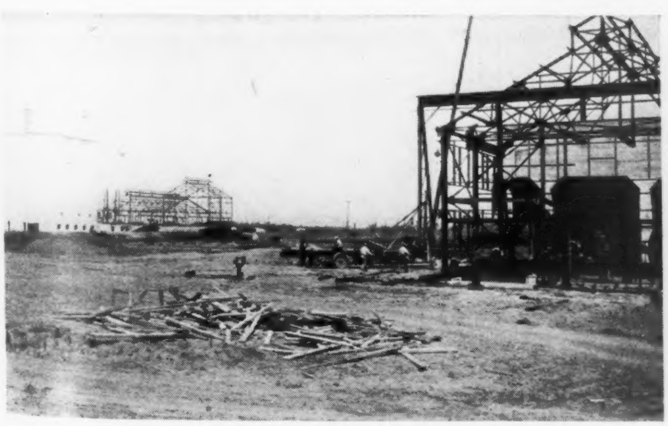
The construction is such that the crane can deliver material into each compartment, thus insuring feed into the mills either by the crane from storage or from the overhead conveyor system. The concrete structure makes a flat bottom bin. In the bottom of the bin is hung an inverted structural steel cone terminating at the mill feed. This type of construction gives a large capacity and eliminates trouble from choking spouts. The side wall inside the craneway extends to the ground and acts as a side retaining wall for the storage pile and at the same time acts as a building wall for the mill building.

The grinding mills extend under the feed bin so as to take their feed directly from the cone bottom bins referred to above. In this manner all space is used without a loss of bin capacity and the mill building is reduced in size.

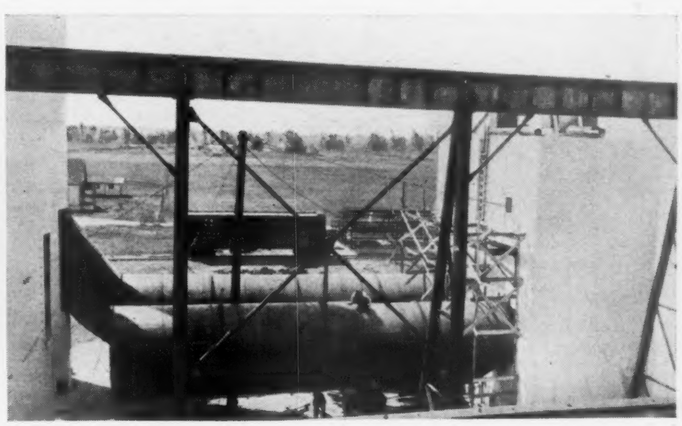
Two wet grinding mills, each with three compartments, constitute the raw grinding department. Each is direct connected to a synchronous speed electric motor working through a magnetic clutch. The slurry discharge is into a slurry pit from which it is pumped into slurry storage tanks.

Slurry Storage and Agitation

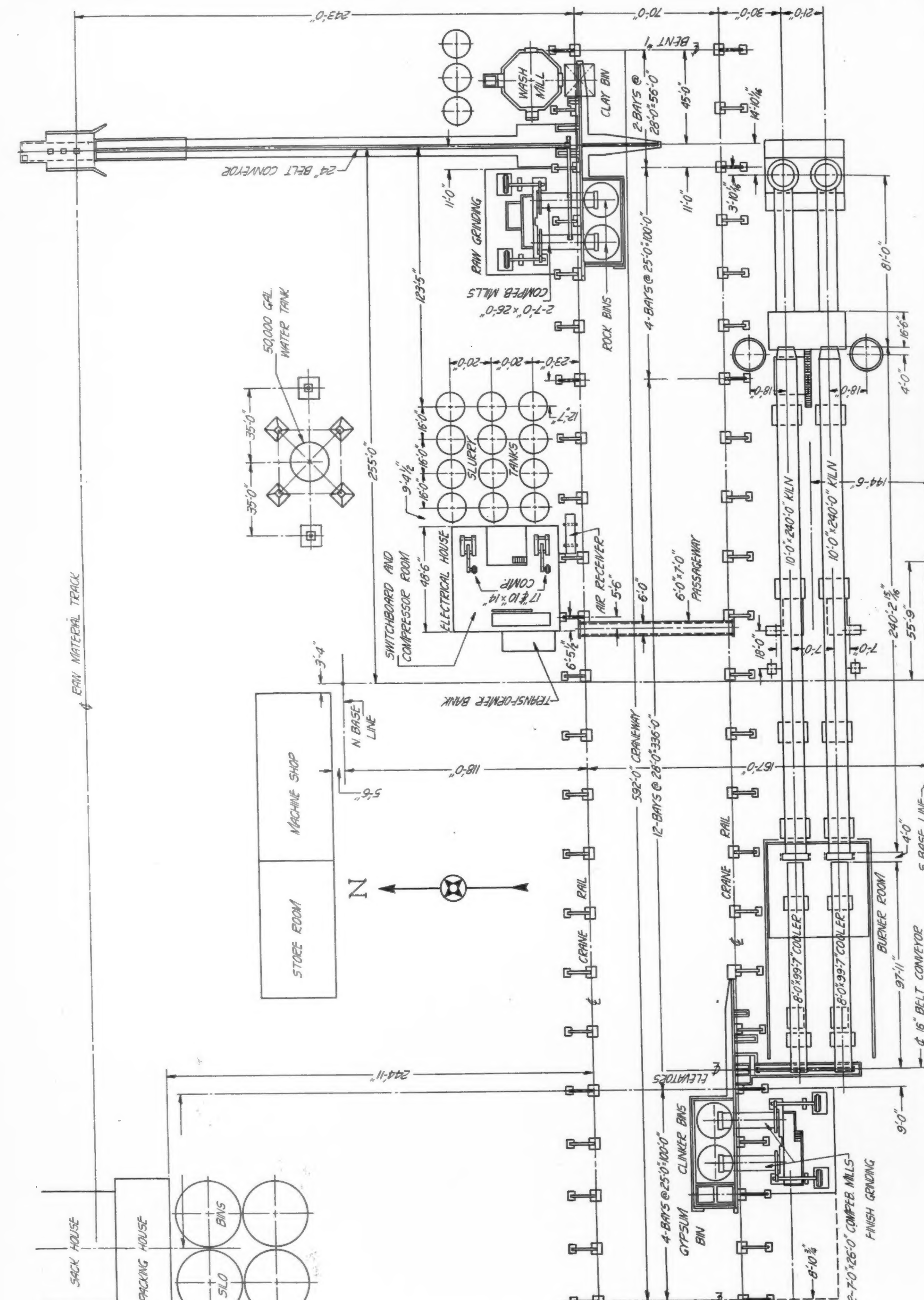
Slurry is stored and blended in twelve



Stock and bag houses (left) and clinker grinding department at right



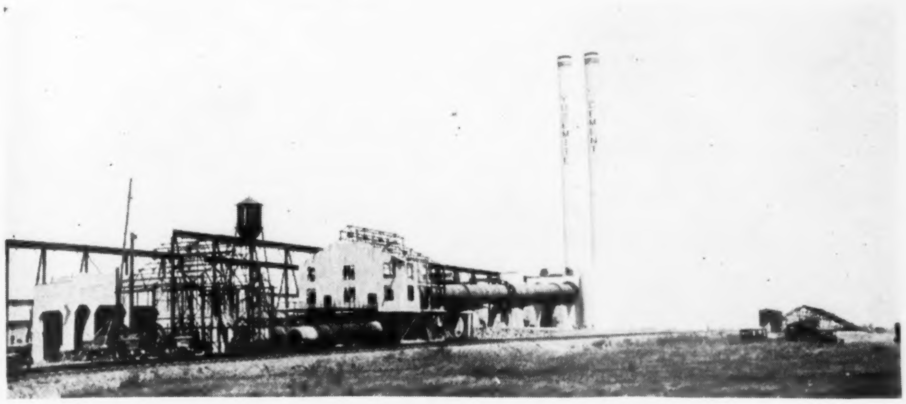
Flue connections from kilns to stacks and in the foreground part of the bridge-crane structure



General ground plan of the Merced, Calif., plant of the Yosemite Portland Cement Co.

flat-bottomed steel tanks. Steel tanks were used because they were sold to the present owning company as a part of the equipment transferred by the previous company. Each of the tanks can be filled from the grinding mill pump and also from the blending pump and each of the tanks can be discharged into the blending pump.

All slurry in the slurry storage tanks and in the kiln feed tanks and also the clay in the clay slurry tanks is agitated by compressed air. Six air pipes running down on the inside of each tank deliver compressed air near the bottom and near the periphery of the tank. Arrangement is made so that a large volume of air can be delivered for violent agitation or a minimum volume for maintaining the mixture. By means of a specially designed device, air is admitted into one pipe of a tank. After a few seconds' time the air is shut off in this pipe and delivered to the pipe next to it. A continuation of this process successively delivers air into each of the pipes in the tank. A slight swirling of the slurry, together with the intermittent agitation from pipe to pipe, maintains the mixture with a minimum of air.



General plant view from the south. Note the small height of the kiln foundation

Finish Grinding Department

Two clinker grinding mills, each with two compartments, constitute the finish grinding department. Each is direct-connected to a synchronous speed electric motor working through a magnetic clutch.

The discharge from the two mills is into a cross screw conveyor which delivers the cement into a Fuller-Kinyon pump. The Fuller-Kinyon pump delivers the cement through a 600-ft. pipe to the stock house.

Two specially designed gypsum feeders, one for each mill, are installed under the gypsum bin. Each feeder discharges into a separate screw conveyor and delivers the gypsum to the feed end of the mill. The screw conveyor is driven by the grinding mill and the feeder is driven by the screw conveyor.

Because of the physical properties of gypsum, and because of the small amount used, a satisfactory, uniform flow is difficult to obtain unless the gypsum is specially prepared. The company's engineers designed a special machine so made as to give a large opening from the bin into the feeder and at the same time regulate the flow.

Kilns and Coolers

Two rotary kilns, each separately driven by a variable speed motor, and two rotary coolers, each separately driven by an electric motor, comprise this department. A Ferris wheel type feeder direct-connected to a variable-speed motor, which is operated from the burning end of the kiln, regulates the kiln feed.

Two brick-lined concrete stacks, one for each kiln, produce the draught. A long horizontal flue between the kiln and stack serves as a dust collector. All dust settled in the dust chamber, horizontal flue and stack is collected by a screw conveyor and elevated dry directly into the kiln feed pipe.

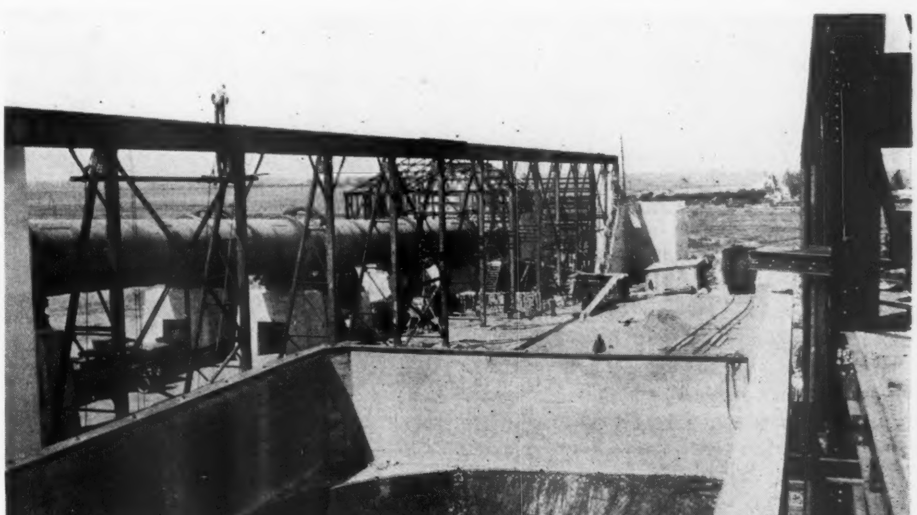
One 600 bbl. concrete slurry tank is provided for each kiln. These tanks are above ground. Each tank can be discharged into a slurry kiln feed pump set in between the two tanks. The overflow from the feeders flows directly back into the tank from which the pump is drawing.

Fuel oil is used for firing the kiln, and the oil is heated by steam. Air at two

Cooler hood in position for lining

pounds pressure is used for atomization. Burners, which have been developed by the engineers during years of experience, are used. They are made from details designed in the engineering department. One burner is used for each kiln and the adjustments are such that a change in direction of the flame can easily be made. By a simple adjustment the flame can be made narrow and long or wide and slow as required.

The cooler hood is specially designed and is supported on wheels similar to a kiln hood. It is made with a structural steel frame lined with fire brick. It fits close to the cooler end and snug up to the kiln firing floor, thus insuring a practically air tight



Interior view of craneway showing kilns and upper part of mill bins

connection between kiln and cooler. It can be rolled back for inspection or repairs to itself, or to the cooler.

The draft of air through the cooler is into the kiln where it is used for combustion.

A cross belt conveyor delivers the cooled clinker from the coolers to a double elevator, the only one in the plant exclusive of the stock house. This elevator discharges the clinker over a reinforced concrete retaining wall, where it can be reclaimed by the bridge crane. A cross belt conveyor is provided so that the elevator discharge can be put directly into the grinding mill bins, if desired. By this arrangement all of the clinker can be delivered directly into the grinding mills, all of it can be put into storage or any proportion can be mixed with stored clinker as it is fed into the grinding mills.

Electrical Equipment

All motors are 440-volt, 60-cycle, 3-phase, alternating current motors. Except for kiln and cooler drive all motors are direct-connected to their loads through herring-bone speed-reducers, using a common cast-iron base for motor and reducer.

Current is purchased from the San Joaquin Light and Power Corporation and transformed by the cement corporation before it is delivered to the switchboard.

The main switchboard is used as a control board distributing current to the various departments. In each department is located the necessary switching equipment for control of its motors. Push button control is used almost entirely.

Buildings

All mill buildings are structural steel frame covered with galvanized corrugated steel sheets and provided with windows and ventilators. Buildings are provided as follows:

(1) Finish grinding department.
(2) Raw grinding department.
(3) Switchboard and compressor room.
(4) Kiln firing department.
(5) Sack repair house.
(6) Bagging department.

In addition the following buildings are of wood frame covered with corrugated steel:

(1) Raw material belt conveyor.
(2) Machine shop.
(3) Storeroom.
(4) Office (wood exterior).
(5) Stock house.

A reinforced-concrete, silo-type, stock house having a capacity of 60,000 bbl. of cement is provided. This is made up of four 32-ft. by 60-ft. tanks together with the star bin between them and three smaller compartments on the outside. An above ground basement, with windows, is equipped with screw conveyors which deliver the stored cement from bins to the Bates valve-bag machines through the medium of a bucket elevator.

Two Bates machines discharging to a common belt conveyor finally deliver the sacked cement into the cars for shipment.

Fuel Oil

Fuel oil is received in tank cars. A concrete below ground storage, with a capacity of 8,000 bbl. of oil is provided with a structural steel roof covered with galvanized corrugated steel sheets. Tank cars discharge oil into a concrete trench in which the oil flows by gravity into the storage. A pump, placed at the same elevation as the bottom of the tank, delivers the oil to the kiln heaters and burners.

Equipment

The major equipment was furnished by manufacturers as shown in the list below:

Allis-Chalmers Manufacturing Co.

26-ft. clay wash mill.
7-26-ft. three compartment wet grinding mills.
7-26-ft. two compartment dry grinding mills.
500-hp. synchronous motors.
10 by 240-ft. four support kilns.
Ferris wheel kiln feeders.
30-in. McCully gyratory crusher.

Northern Engineering Co.

10-ton bridge crane, 70-ft. span; 440-volt, 3-phase, 60-cycle alternating current motors. Traveling speed, 500 ft.p.m.; hoisting speed, 100 ft.p.m.; trolley speed, 200 ft.p.m.

A. R. Wilfley & Sons

200-bbl. per hour slurry pumps for raw grinding department and for kiln feed.
500-bbl. per hour slurry pump for blending and pumping to kiln feed tanks.
All pumps direct-connected to driving motor and supported on a common base.

Pacific Gear & Tool Works

Herring-bone speed reducing sets with bases for connected motor.

Westinghouse Electric & Manufacturing Co.

All motors except 500-hp. synchronous.
Motor control switches.
Main switchboard.

Weber Chimney Co.

10-ft. by 200-ft. concrete stacks, brick-lined for half the height.

Worthington Pump and Machinery Co.

4-in. by 6-in. Dean triplex oil pump, direct-connected to motor.

Yosemite Portland Cement Corp.

8-ft. by 100-ft. clinker coolers. These were made over from old kilns bought with equipment from previous company.

Personnel

The officers of the Yosemite Portland Cement Corp. are: A. Emory Wishon, president; W. A. Sutherland, vice-president; Murray Bourne, secretary; A. Neal Jacobs, treasurer; Dewey A. Schlemmer, sales manager. All the above are located in Fresno, Calif. George A. Fisher is superintendent, with headquarters at Merced, Calif. The Stevenson Engineering Corporation, of San Francisco, are consulting engineers and chemists for the Yosemite Portland Cement Corporation.

Yosemite Portland Sets Off Large Blast at Quarry

AFTER three weeks prepartion, 12,000 lb. of dynamite were set off at the Yosemite Portland Cement Co.'s quarry at Jenkins hill, 58 miles from Merced. The limestone dislodged will be used as raw cement material for the new plant at Merced. At the same time, the cut made was necessary to permit the construction of a track past the deposit to a point where crushing equipment will be placed.—*Fresno* (Calif.) *Republican.*

Temperature Humidity Box for the Storage of Cement Test Specimens

THE constant temperature and humidity box for storing cement, described in ROCK PRODUCTS, April 16, p. 67, designed by the U. S. Bureau of Standards, has been in operation for over two months. For the past 55 days the box has been in continuous service.

The temperature does not vary more than 1 deg. from 70 deg. F. for the most severe operating conditions when the doors are being opened for the reception and the removal of specimens for observation. Under these conditions the humidity is a minimum of 90%, with but very occasional drops below 93%. During the periods when the doors are kept closed the temperature variation is ±½ deg. F.; the humidity 97% or better. Neither the temperature nor the humidity can be determined any more accurately than as stated because of the comparatively low precision of the recording thermometers.

Some interesting observations were made upon the influence of the circulating air and water. The circulating water acts as a temperature stabilizer. When the water is not circulating the temperature is unstable, rising and falling periodically. The amplitude and range of this period is dependent upon the adjustment of the control and the rates of cooling and heating supplied by the refrigerator and heating element, respectively. The period ranged from 4 to 10 oscillations per hour and the amplitude from 2 to ½ deg. The regularity rather than the magnitude emphasizes the oscillations. Changes of equal magnitude which occurred much more slowly and irregularly would, in most cases, be overlooked unless the charts were closely scrutinized.

With circulating water shut off but air being circulated, the humidity in 24 hours dropped from 97 to 68%.

During these tests the box was kept closed continually. The apparatus required one hour in which to regain the normal humidity conditions in the box after the circulating water and air had been turned on. With the door open six minutes the humidity fell to 50%, the humidity of the room.

It is advisable to use tungsten points for the control relay contacts. When first placed in service the silver points, apparently making physical contact, made no electrical contact, so that, without control, during one evening the temperature of the box rose to about 130 deg. F. No trouble has been experienced since tungsten points have been put on the relay contacts.—*Technical News Bulletin,* of the U. S. Bureau of Standards.

Gradation of Machine-Broken Stone*

Part IV. Effect of Variation in Crushing Stroke —Typical Jaw Crusher and Disc Crusher Tests

By Wm. T. W. Miller
Sheffield, England

IN any reciprocating breaker the travel of the moving member has an important bearing on the gradation of the product and Diagrams 12 and 13 are included to show the effect of a relatively small increase in crushing stroke on the proportions of the various sizes made in the process of crushing.

It will be noted that the curves cross each other owing to fact that not only does the greater travel make more fine material but it also adds to the amount of oversize to some extent.

The bigger movement gives quicker crushing and considerably increases the output from the machine. The material is not retained for so long a period in the crushing cavity but is compacted through a greater distance, for a specified mean aperture at the sizing point the maximum opening is greater and the minimum opening is less than with a shorter stroke. In other words, there is greater freedom for oversize particles to escape towards the end of the drawback stroke and a closer squeeze on the material during the forward movement which gives further penetration and increased disintegration.

*Copyright, 1927, by Wm. T. W. Miller.

The breaker used for this series of four tests was fitted with special crushing plates consisting of a curved swing with a straight fixed jaw, the teeth being in practically new condition. As previously mentioned this combination gives a selective action which reduces the proportion of fines and to this extent these curves vary slightly from the average diagram.

Articles in This Series

Part I—Thoroughgoing study of the percentages of various sizes produced in jaw and gyratory crushers. March 19, 1927.

Part II—Study of percentages of various sizes produced in jaw, disc and roll crushers. April 16, 1927.

Part III—Effect of variation in feed size—Single stage vs. double stage crushing—Crushing in closed circuit. May 14, 1927.

Part IV — Effect of variation in crushing stroke — Typical jaw crusher and disc crusher tests. This issue.

Part V—Effect on character of product by the shape and condition of crushing surface. To be published.

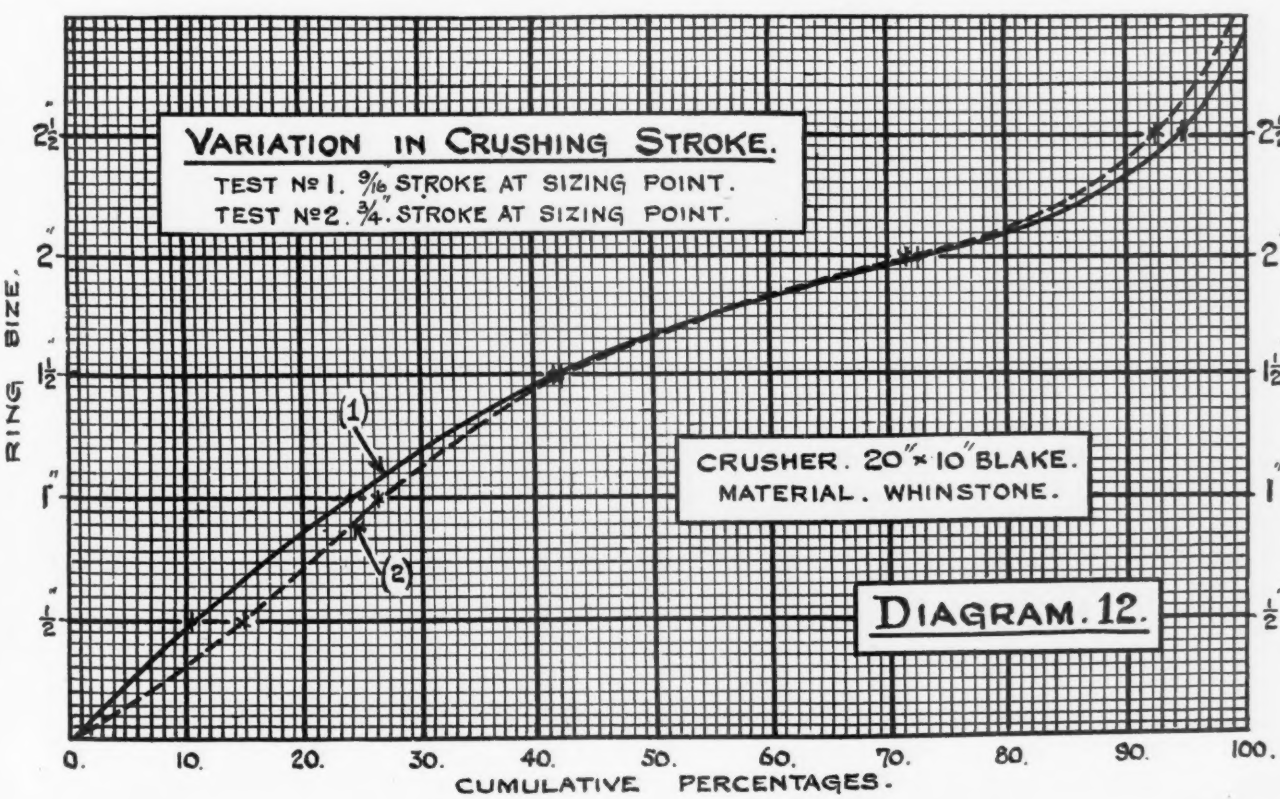
Part VI—Effect of intermittent or irregular feeding on composition of product. To be published.

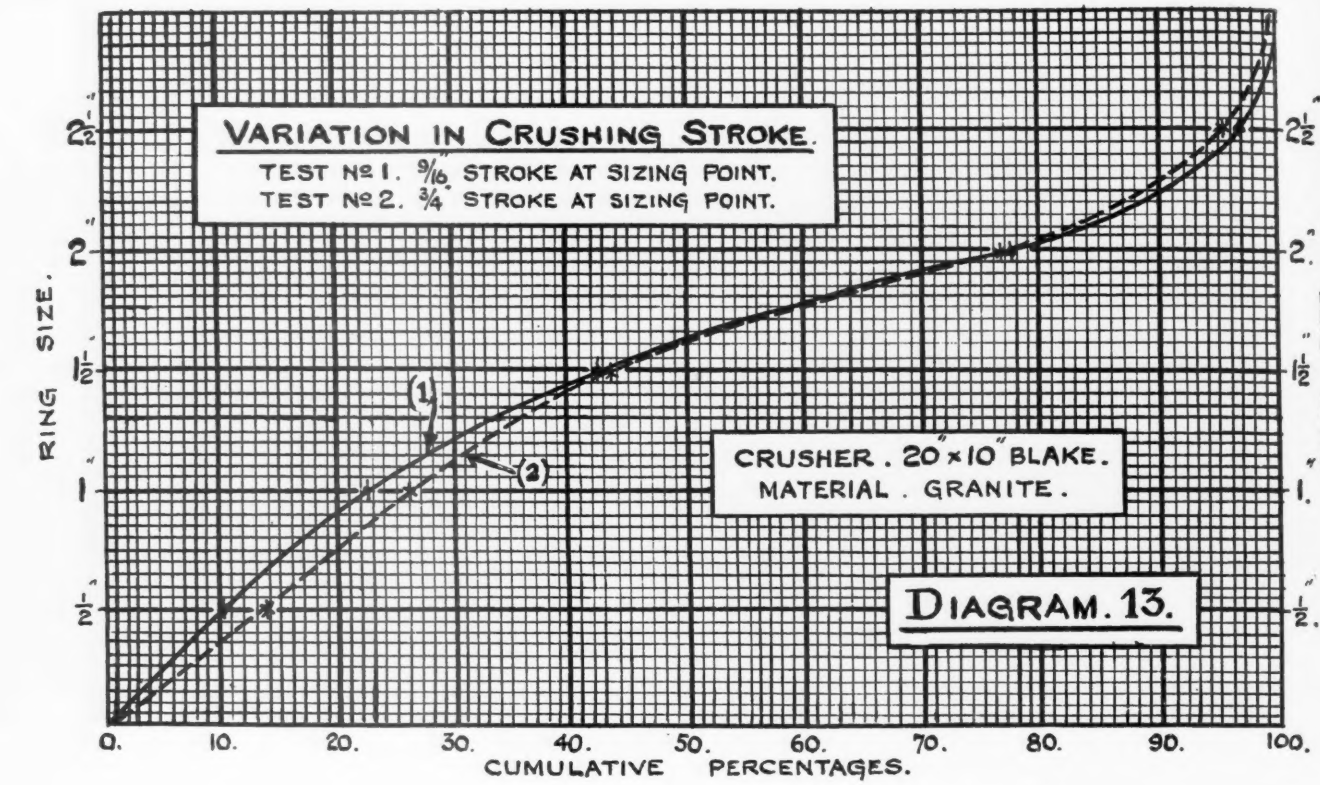
The evidence is sufficient to show that the crushing stroke should be taken into account when considering the gradation of the product.

There is one feature which is noticeable when comparing the analyses from a graduated series of crushing tests and that is the tendency for the gradation curve to flatten when the machines are made to give smaller products.

Diagram 14 includes six representative curves from actual tests arranged to show the progression from coarse to fine crushing. In all cases the machines were Blake type breakers with straight jaws in fair condition, the crusher used for Tests Nos. 5 and 6 being specially designed for fine crushing.

It is not altogether easy to explain the reason for this change in the character of the diagram. The extent of reduction was not quite equal in all cases, but the feed size



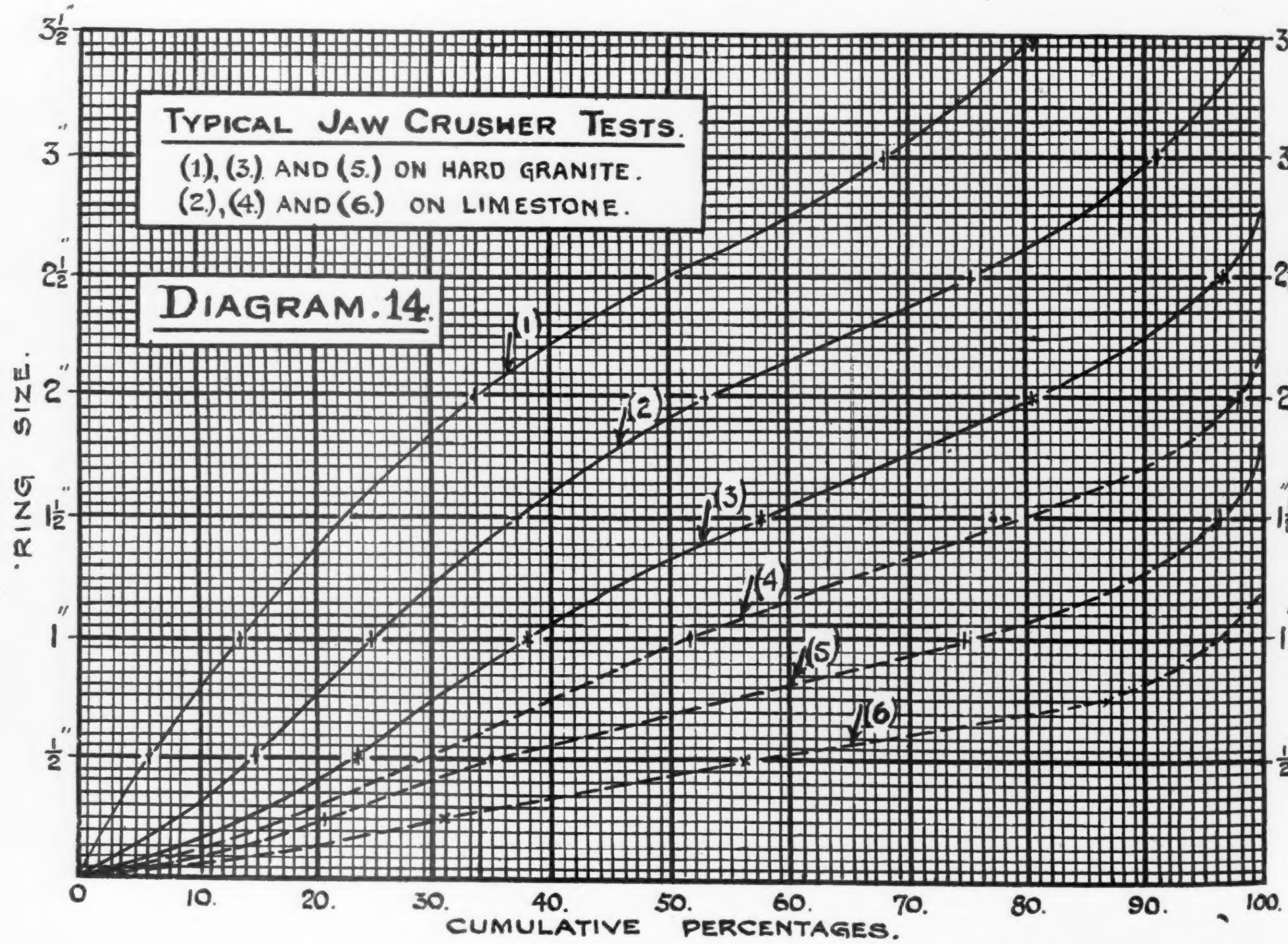


reduced as the finished size diminished and this factor is not sufficient to account for the flattening of the curve.

In order to show how this tendency persists in the field of secondary crushing as well as in primary breaking a further Diagram 15 is given including an analysis of mine sizing tests of the products made by horizontal disc crushers.

Here again the feed size varied and the ratio of reduction for each test might not be strictly comparable, but this alone is not sufficient to account for the evident change in the contour lines.

In the opinion of the writer there may be two causes for this modification which are closely allied. When the aperture at the sizing point is restricted to give the finer



product the ratio between maximum and minimum opening is altered very considerably from that applicable to the coarser crushing.

Take for instance Tests Nos. 5 and 6 on Diagram 14, the crushing stroke at the bottom of the jaw would be about ½ in. total and the maximum opening between ¾ and 1 in., so that at the end of the crushing stroke the material between the jaw plates would be compacted into a space from one third to one half the width occupied at the commencement of the stroke.

In the machine used for Test No. 3 (Diagram 14) the travel would be about ¾ in. and the maximum opening 2 in. so that the stone at the sizing point would be made to fill a space 1¼ in. wide at the end of the stroke and the ratio would not exceed 1½ to 1.

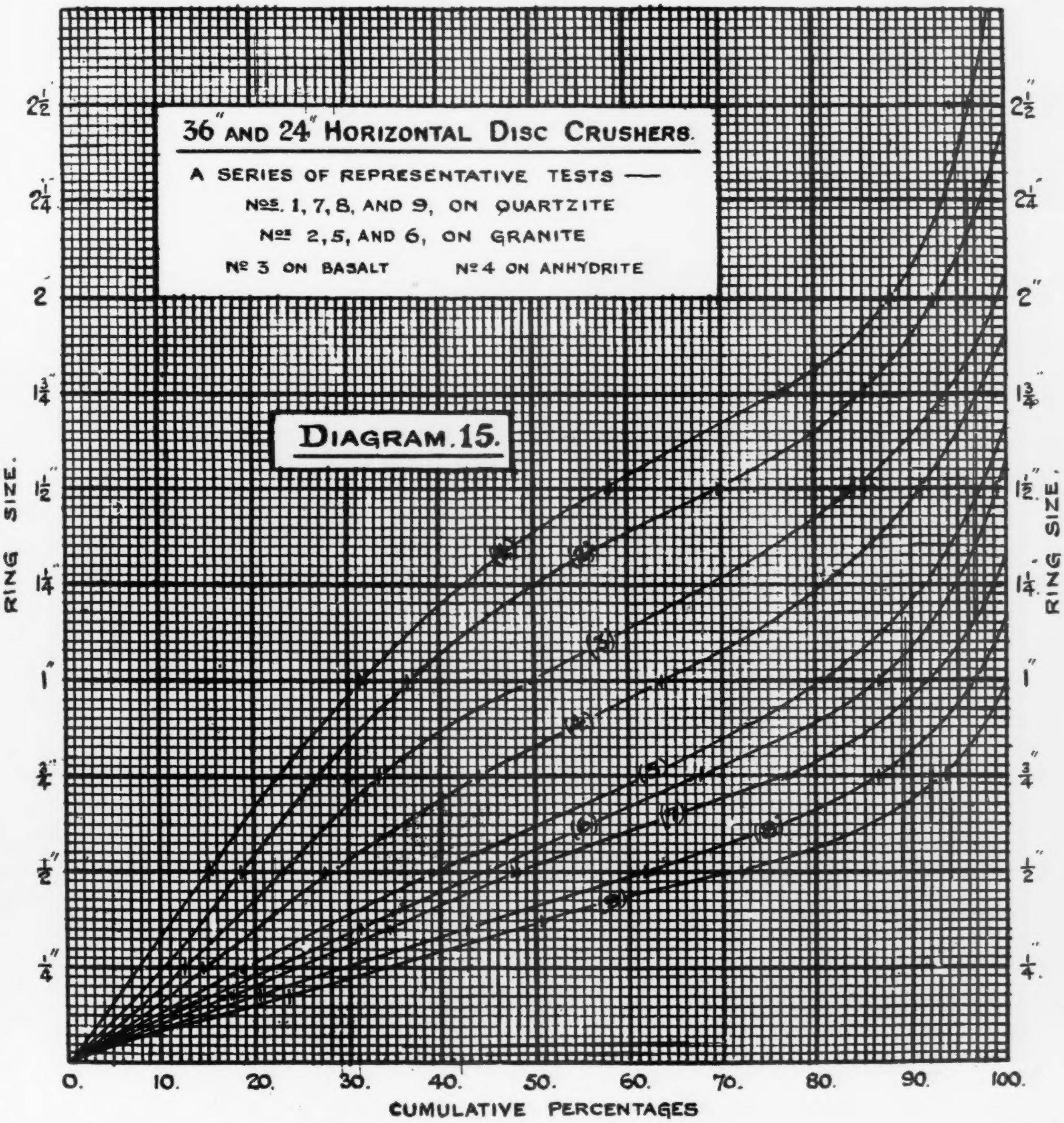
The same theory can be applied to the disc crusher tests on Diagram 15. In this case the upper end of the curve changes more abruptly due to the quantity of flakey pieces.

If this reasoning is correct the alteration in the scale of sizes is caused by overcrushing or packing or a combination of both.

(To be continued)

Dixon Company Celebrates a Century of Progress

A CENTURY of accomplishments by an industrial concern is something which commands respect, particularly in these United States, which are but a few years older themselves. To start out with an idea or purpose in mind and to carry its development along with the progressive change of a nation during a full 100 years is the contribution of the Joseph Dixon Crucible Co., Jersey City, N. J. The story of this company, put in an interesting manner, is contained in a well printed little booklet entitled "A Tale of Yesterday, Today and Tomorrow," which has just been brought out by the Dixon company to commemorate its 100th anniversary. The booklet is well-worth reading for not only does it record the achievements of the Dixon company but some interesting sidelights are thrown on the changes in conditions of industry and domestic life in the past 100 years.



The New Plant of the Marion Sand and Gravel Company

A 500-Ton a Day Plant Completely Modernized—Screens with Individual Motor Drives—Wired and Lighted for Night Operation

By L. K. Warner
President, Marion Sand and Gravel Co., Marion, Ohio

THE Marion Sand and Gravel Co., Marion, Ohio, was incorporated in 1919. It has operated continuously ever since. Its capital is $50,000. In 1921 a 1-cu. yd. Sauerman slackline cable excavator was installed, and this is still in operation. The remainder of the plant recently has been completely rebuilt and modernized, and we have reason to believe it is as modern and efficient as any plant of its size anywhere.

Deposit

The sand and gravel deposit is of glacial origin, about 45 ft. thick, on limestone. The deposit runs about 85% sand and 15% gravel. The ground water level is about 25 ft. from the top. All the material is removed to the limestone bottom, without attempting to pump out the water. The property is 39 acres in extent, and the top 5½ ft. of clay top soil is removed by steam shovel and motor truck, wasting the stripping in a work-out part of the pit.

Field hopper and slackline cableway excavator

Equipment

The Sauerman 1-cu. yd. slackline cableway excavator is powered by a Thomas electric hoist. The bucket dumps into a field hopper, which has a grillage, or grizzly, of railroad rails, which removes the occasional over-size boulders. Beneath the hopper is a steel gate which feeds a 4x8-ft. (Webster) rotary scalping screen. This screen has 1¾-in. round holes.

Most of the material from the deposit passes through this screen to a 20-in. belt conveyor, 193-ft. centers, which elevates the material to the washing and sizing screen. The rejects from the scalping screen go to a hopper feeding a No. 5 Kennedy gyratory crusher. The crushed material either can be elevated back and fed again to the scalping screen, or conveyed to stock pile. There is provision for running the crusher only occasionally, or just when the feed hopper has accumulated sufficient over-size to make crusher operation necessary.

The main washing and sizing screen is 4½ by 18 ft., with an exterior sand jacket.

General view of the new plant of the Marion Sand and Gravel Co., Marion, Ohio

There are three sections of the screen proper—a scrubber section, a ¾-in. perforated section, and a 1¾-in. perforated section. The sand jacket is in two sections, ⅛-in. clear mesh for mason sand, and ¼-in. clear mesh for concrete sand. The rejects from the sand jacket are ¼-⅝-in. pebbles. Perforated steel plates are used for the main screen and woven-wire mesh for the sand jacket.

Each grade of sand is collected by a separate hopper and directed to dewatering or sand-separating machines. The separator used for the fine sand (⅛-in. mason sand) is the McGee drag conveyor type, and the separator for the concrete sand is the Telsmith tilting box type. Sand from the separators goes direct to bins holding about 5 carloads of each grade.

The bins are all 18x39 ft. (inside dimensions) and 35 ft. above the rail. They are of standard frame construction, with 2-in. inside sheathing backed by 2x8-in. vertical studding. The studding is held by 6x8-in. horizontal belts or whalens, spaced about 4½ ft. apart, vertically. Oregon fir, all rough sawed to full dimensions, was used throughout. The bin structure rests on heavy concrete footings 3 ft. high. The bins are thoroughly reinforced with tie rods through them in both directions, using 1⅛-in. round rods at the whalens. They are also tied together at the planking at the partitions.

The bins are divided into two large sand compartments and two smaller gravel compartments. They have no floors. The material rests on the ground and is chuted out of the sides of the bins, on one side to railway cars, and on the opposite side to motor trucks.

Special Features

Individual motor drives are provided on each of the screens, on the conveyor, crusher, hoist and pump—six motors in all. The pump for wash water is a 4x4-in. Weiman, belt-driven from a 30-hp. motor.

The capacity of our plant is 500 tons of sand per 10-hour shift, plus a variable amount of gravel and crushed material. The grades of material produced are mason sand; concrete sand; ¼- to ¾-in. pebbles; ¾- to 1½-in. gravel. The plant is wired and lighted for night work.

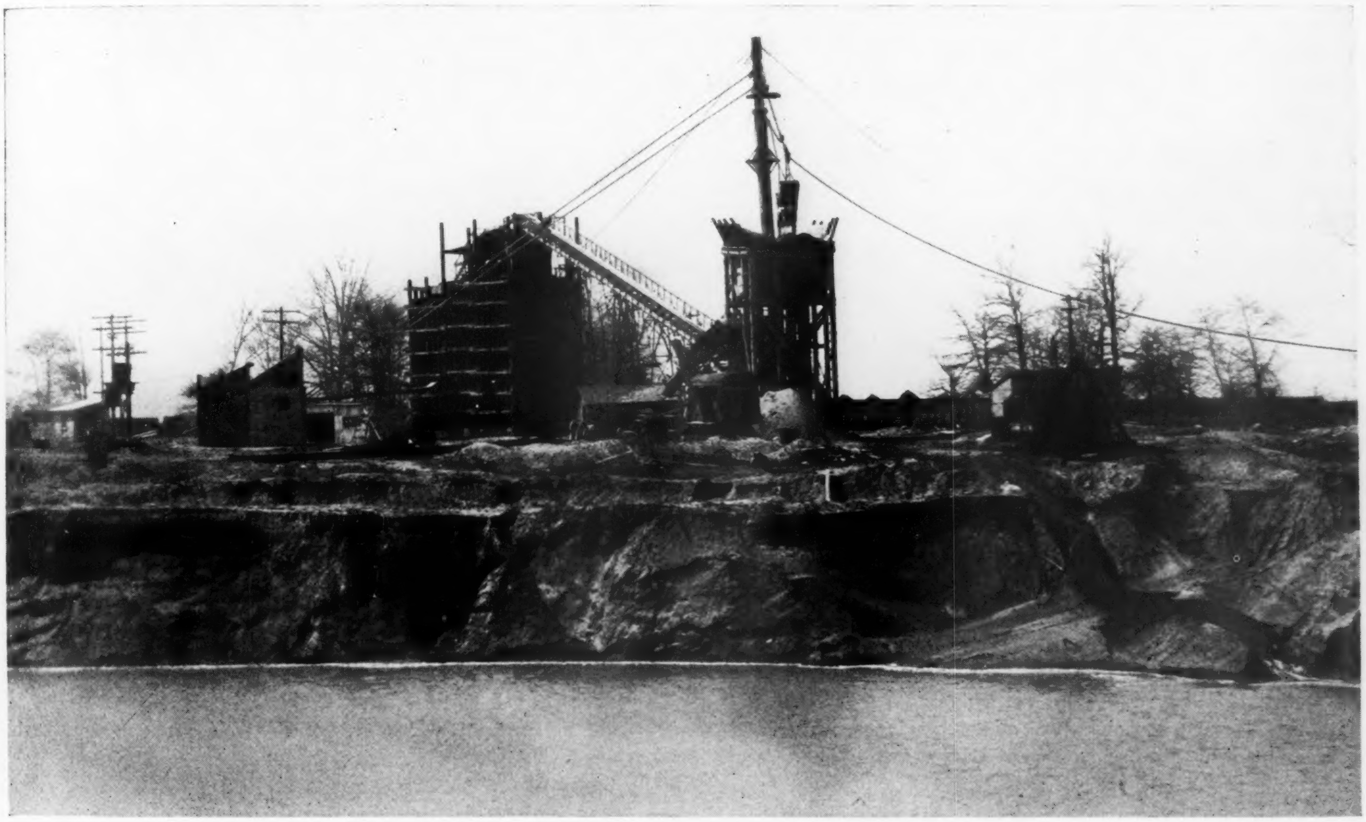
The plant is located on a spur of the Erie R. R. Shipments are also made from Marion via Big Four, Hocking Valley and Pennsylvania railroads.

Personnel

The writer is president of the company; W. H. Symes is secretary and treasurer. The president has charge of sales, Mr. Symes of production.

The plant was designed by the two officers of the company and erected by the company's own construction gang, composed of regular plant employes, plus additional carpenters, electricians, etc., during the past winter. Mr. Symes supervised the construction work.

Conveyor equipment and screens were furnished by the Webster Manufacturing Co., Chicago. The steelwork supporting structure for the conveyor and all the hoppers, chutes and loading gates were furnished by the Fairfield Engineering Co., Marion, Ohio.



View of the Marion Sand and Gravel Co. plant from the pit

Missouri Company to Put Louisiana Sand Plant in Operation

THE Louisiana, Mo., sand plant, built last year at a cost of $75,000, will be put in operation shortly, according to J. P. Pierson, president of the Missouri Sand and Gravel Co., owners of the plant. Two operating shifts will be employed.

The new plant was not operated a great deal last year on account of the shallow water along the river front where the plant is located, preventing landing of barges in which sand and gravel is conveyed from the gravel beds in Salt river, several miles north of Louisiana. This situation has been remedied, however, for the harbor was deepened by a government dredge boat during the past winter.—*Quincy* (Ill.) *Whig-Journal.*

Phosphates in British Columbia

SURVEYORS of the Consolidated Mining and Smelting Co. were busy most of the year investigating the phosphate rock resources of the Elk valley. Their attention was principally confined to a seam six miles from Fernie and another near Crows Nest, B. C. The survey will be resumed at a later date.

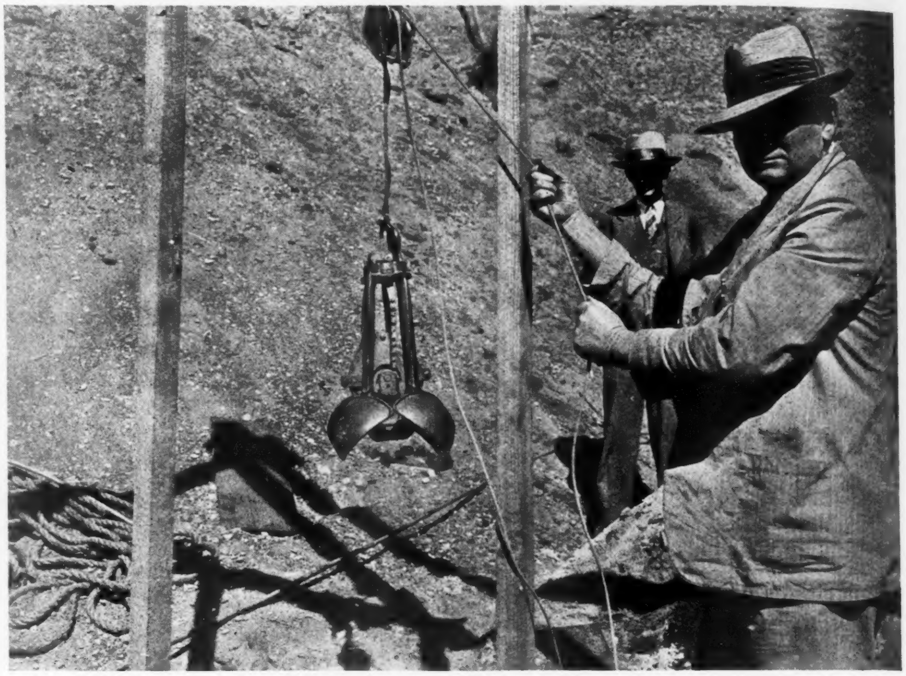
Hints and Helps for Superintendents

Prospecting Outfit for Sand and Gravel Deposits

ROCK PRODUCTS has often been called upon to describe a simple outfit for sinking prospect holes in sand and gravel. One that is used by the Alabama Sand and Gravel Co. of Montgomery, Ala., is shown in the picture which accompanies this.

The main feature of the outfit is a 12-in orange-peel bucket which is a standard tool that may be bought from the makers. It may be suspended from a tripod or from a square frame made of two uprights and a cross piece. It is easier to work around a frame of this kind than it is to work around a tripod. The bucket is handled by a light line received through a double block. The lower part of the frame is fastened to a square of planking like a well curbing. The ground is levelled off a bit, if necessary to make the frame stand vertical.

In hard ground sinking can often be done without casing the hole. In wet ground the hole must be cased. A 12-in. casing is used and it is pulled up after the hole is completed.

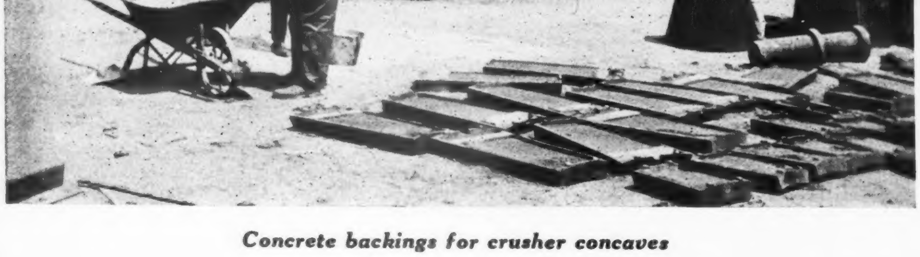


Simple outfit for sand and gravel prospecting

Concrete Used for Backing Crusher Concaves

AT the plant of the Weston and Brooker Co., Cayce, S. C., concrete is used for backing up the concaves of the larger crushers. Off-hand, it would seem that concrete would crack and disintegrate when used for such a purpose, but it is said to work very satisfactorily. When it is confined so that it cannot move it appears that the concrete will stand the pressure of crushing without breaking. The concrete, which is mixed by hand, is applied to the backs of the concaves.

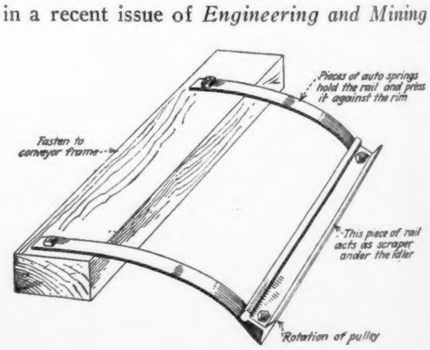
At the plant of the W. R. Bonsal Co., Inc., near Wadesboro, N. C., concrete has been used to change the type of a crusher. The crusher was originally intended as a primary crusher, the concaves sloping outwardly from the mantle to leave a large space at the top. Concaves were bought which would stand more nearly vertical, leaving a space behind them. This space was filled with concrete and a heavy iron ring was placed at the top to hold the concaves out. The crusher had been in use for about three months in this way and the concrete was holding all right when this was written.



Concrete backings for crusher concaves

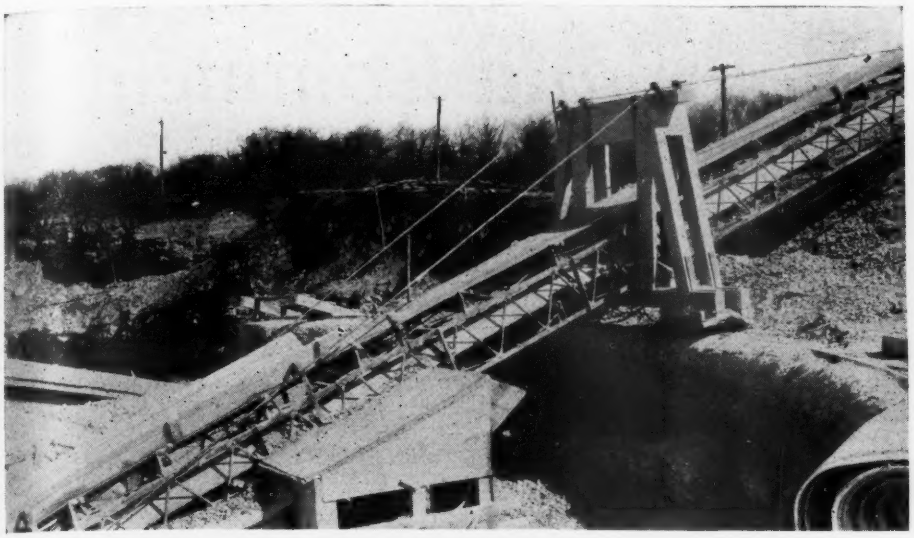
Simple Scraper for Conveyor Pulley

A SIMPLE device for removing the fines which often adhere to conveyor belts and the larger idler pulleys of the return belt, particularly during wet weather, is described by Charles Labbe, Clarkdale, Ariz., in a recent issue of *Engineering and Mining*



Scraper for conveyor pulley

Journal. The attachment, illustrated above, is usually placed at the first large idler. It consists of a piece of light rail weighing from 8 to 12 lb. and of the same length as the face of the pulley. At each end the rail is bolted to a spring (pieces from a discarded auto spring will do) and this in turn is fastened to the conveyor frame by lag-screws or both as shown in the sketch accompanying. The springs keep the scraper pressing lightly against the pulley rim without further adjustment.



Portable belt conveyor especially mounted for stock-piling screenings

Stock-Piling Screenings

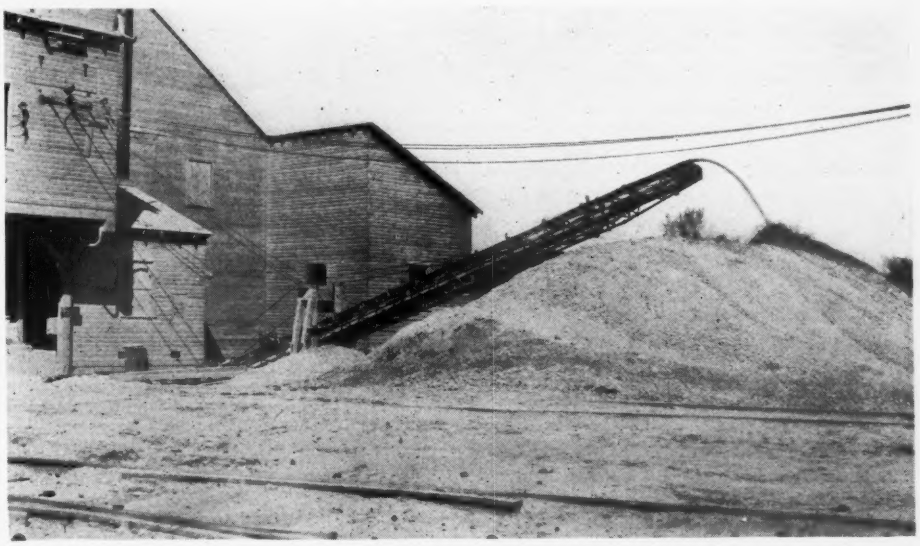
WAYS of stock-piling stone are numerous, but the one shown here is unusual and quite effective. This installation is at the quarry of the Linwood Cement Co., Linwood, Iowa, and consists of a Barber-Greene portable belt conveyor, specially mounted as a fixed piece of equipment—that is the regular wagon wheels have been removed.

In place of the wheels a trussed frame work has been substituted. This truss frame carries the weight of the conveyor and is mounted on flanged car wheels, which travel a rail in the form of the arc of a circle—probably about a 60-deg. arc. The lower end of the conveyor is mounted on a pivot, as shown in one of the views. The electric motor-drive is in a housing carried on the supporting truss of the belt-conveyor. The conveyor is fed, as shown in one of the views, by a fixed belt conveyor from the crushers and screens.

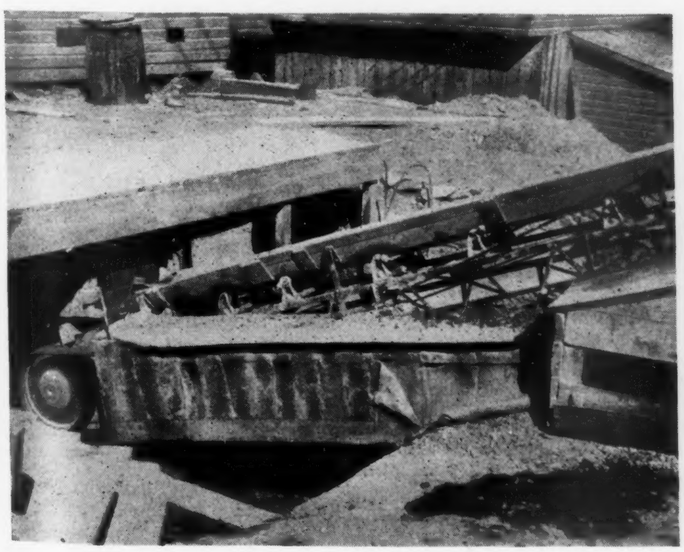
The purpose of the device is to take care of screenings in wet or damp weather, or whenever quarry conditions make it difficult to get clean materials in the smaller sizes of stone (about ½ in. down). In dry weather this material would go through the fine screening and agricultural limestone parts of the plant and be made into finished products. Under other conditions, as already noted, it is preferable to tap it out of the plant at the point shown.

This material is then stock-piled, temporarily, and disposed of for earth road and driveway improvement. The mounting of the portable conveyor as shown provides for sufficient stock-piling to take care of material quite effectively—at a relatively small installation cost. The stock pile is adjacent to railway tracks where it may be reloaded into railway cars by a locomotive crane, or loaded into motor trucks by the same crane.

J. F. Schroeder is secretary, treasurer and general manager of the Linwood Cement Co., and J. A. Thiessen is superintendent at the Linwood plant.



Stock-pile may be rehandled by locomotive crane on track shown in the background



Details of special mounting of belt conveyor

Feed end of conveyor showing pivot mounting

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Allentown Portland Cement Co. (common)[32]	May 24	....	1½	3	
Allentown Portland Cement Co. (6% bonds, 1932)[32]	May 24	....	87	92	
Alpha Portland Cement Co. (common)[2] new stock	June 7	No par	39	41	37½c quar. Apr. 15
Alpha Portland Cement Co. (preferred)[2]	June 7	100	115	....	1¾% quar. June 15
American Lime and Stone Co. (7% bonds, 1942)[32]	May 24	....	97	101	
Arundel Corporation (sand and gravel—new stock)	June 6	No par	36½	36¾	50c April 1
Atlantic Gypsum Products Corp. (1st 6's carrying 10 sh. com.)[10]	June 8	....	117	120	
Atlas Portland Cement Co. (common)[2]	June 7	No par	42	44	50c qu. March 1
Atlas Portland Cement Co. (preferred)	....	100	....	....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)[2]	June 7	33⅓	43	....	2% quar. Apr. 1
Beaver Portland Cement Co. (1st Mort. 7's)[8]	July 29	100	100	100	
Bessemer Limestone and Cement Co. (Class A)[4]	Apr. 8	....	34	34¾	75c quar. May 1
Bessemer Limestone and Cement Co. (6½% bonds)[4]	Apr. 8	....	99	100	
Boston Sand and Gravel Co. (common)	June 3	100	70	....	1% qu., 2% ex. Jan.
Boston Sand and Gravel Co. (preferred)	June 3	....	....	85	1¾% quar. Jan. 1
Boston Sand and Gravel Co. (1st preferred)	June 3	....	....	90	2% quar. Jan. 1
Canada Cement Co., Ltd. (common)	June 8	100	150	....	1¾% April 16
Canada Cement Co., Ltd. (preferred)[11]	June 6	100	118	119	1¾% quar. May 16
Canada Cement Co., Ltd. (1st 6's, 1929)[11]	June 6	....	101¼	102½	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11]	June 6	100	96	99	
Charles Warner Co. (lime, crushed stone, sand and gravel)	June 4	No par	25	....	50c Apr. 11
Charles Warner Co. (preferred)	June 4	100	105	....	1¾% quar. Apr. 28
Charles Warner Co. (lime, crushed stone, sand and gravel) 7s, 1929[16]	June 3	100	102	102½	
Cleveland Stone Co. (new stock)	June 8	....	50	50	50c qu. June 15
Connecticut Quarries Co. (1st Mortgage 7% bonds)[17]	June 3	100	105	....	
Consolidated Cement Corp. (1st Mort., 6½s, series A)[24]	June 8	100	97	99	
Consolidated Cement Corp. (5 yr. 6½% gold notes)[24]	June 8	100	95	100	
Consumers Rock and Gravel Co. (1st Mort. 7s)[18]	May 31	100	99½	101½	
Coosa Portland Cement Co. (6% bonds, 1944)[32]	May 24	....	70	....	
Coplay Portland Cement Co. (6% bonds, 1941)[32]	May 24	....	88	....	
Dewey Portland Cement Co. (1st mort. 6's 1942)[30]	June 8	100	99	....	
Dolese and Shepard Co. (crushed stone)[7]	June 8	50	94	96	$1.50 Jan. 1, $1.50 ex. Jan.
Egyptian Portland Cement Co. 7% pfd.[21]	June 3	....	85	90	1¾% quar. Oct. 1
Egyptian Portland Cement Co. (common)[21]	June 3	....	5	7	40c quar. Oct. 1
Fredonia Portland Cement Co. (6½% bonds, 1940)[32]	May 24	....	97	101	
Giant Portland Cement Co. (common)[2]	June 7	50	55	65	
Giant Portland Cement Co. (preferred)[25]	June 8	50	44	....	3½% June 15
Ideal Cement Co. (common)	June 8	No par	81	82	$1 quar., $1 ex. Dec. 15
Ideal Cement Co. (preferred)[33]	June 6	100	111	112½	1¾% quar. Dec. 15
International Cement Corporation (common)	June 8	No par	62	63⅜	$1 quar. June 30
International Cement Corporation (preferred)[2]	June 8	100	109⅛	109½	1¾% quar. June 30
Kelley Island Lime and Transport Co.	June 8	100	140	141	$2 quar. April 1
Lawrence Portland Cement Co.[2]	June 6	100	97	101	2% quar.
Lehigh Portland Cement Co.[6]	June 7	50	127	130	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1928 to 1931)[13]	May 21	100	98	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1932 to 1935)[13]	May 21	100	96½	99	
Marblehead Lime Co. (1st Mort. 7's)[14]	June 3	100	100	....	
Marblehead Lime Co. (5½% notes)[14]	June 3	100	98	....	
Michigan Limestone and Chemical Co. (common)[6]	June 7	....	26	28	
Michigan Limestone and Chemical Co. (preferred)[6]	June 7	....	24	26	1¾% quar. July 15
Missouri Portland Cement Co.	June 8	25	42½	43	50c May 1
Monolith Portland Cement Co. (common)[9]	May 31	....	12¾	13¼	8% ann. Jan. 2
Monolith Portland Cement Co. (units)[9]	May 31	....	31¾	33¼	
Monolith Portland Cement Co. (preferred)[9]	May 31	....	9½	10	
National Gypsum Co. (common)[35]	June 8	....	66	67½	
National Gypsum Co. (preferred)[35]	June 8	....	84	86	
Nazareth Cement Co.[20]	June 3	No par	30	32	75c quar. Apr. 1
Newaygo Portland Cement Co.[1]	June 3	....	110	115	
Newaygo Portland Cement Co. (6½% bonds, 1938)[32]	May 24	....	100	102	
New England Lime Co. (Series A, preferred)[14]	June 3	100	....	95	
New England Lime Co. (Series B, preferred)[22]	June 7	100	95	97	
New England Lime Co. (V.T.C.)[22]	June 7	....	33	36	
New England Lime Co. (6s, 1935)[14]	June 3	100	99	101	
New York Trap Rock Corp. (6% bonds, 1946)[32]	June 8	....	98⅛	98¼	
North American Cement Corp. 6½s 1940 (with warrants)	June 8	100	93	93	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[32]	Apr. 26	....	62	67	2 mo. period at rate of 7%
North American Cement Corp. (common)[19]	Apr. 9	....	8⅛	9	
North American Cement Corp. (preferred)	Apr. 25	....	....	....	1.75 quar. May 2
North Shore Material Co. (1st Mort. 6's)[15]	June 8	100	98½	100	
Pacific Portland Cement Co., Consolidated[5]	June 1	100	62½	74	25c mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)[5]	June 1	100	97½	....	3% semi-annual Oct. 15
Peerless Portland Cement Co.[1]	June 3	10	5	5½	
Pennsylvania-Dixie Cement Corp. (1st Mort. 6's)[29]	June 8	100	99⅞	99⅞	
Pennsylvania-Dixie Cement Corp. (preferred)[28]	June 8	100	99	....	1¾% June 15
Pennsylvania-Dixie Cement Corp. (common)[28]	June 8	....	34	34⅜	80c July 1
Petoskey Portland Cement Co.[1]	June 8	10	10½	11¼	1½% quar.
Pittsfield Lime and Stone Co.[31]	Apr. 26	....	....	100	
Pittsfield Lime and Stone Co.[31] (common)	Feb. 25	....	....	25	

(CONTINUED ON PAGE 94)

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee, Higginson & Co., Boston and Chicago. [11]Nesbitt, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson Jr. Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago.

Editorial Comment

Production Profits and Promotion

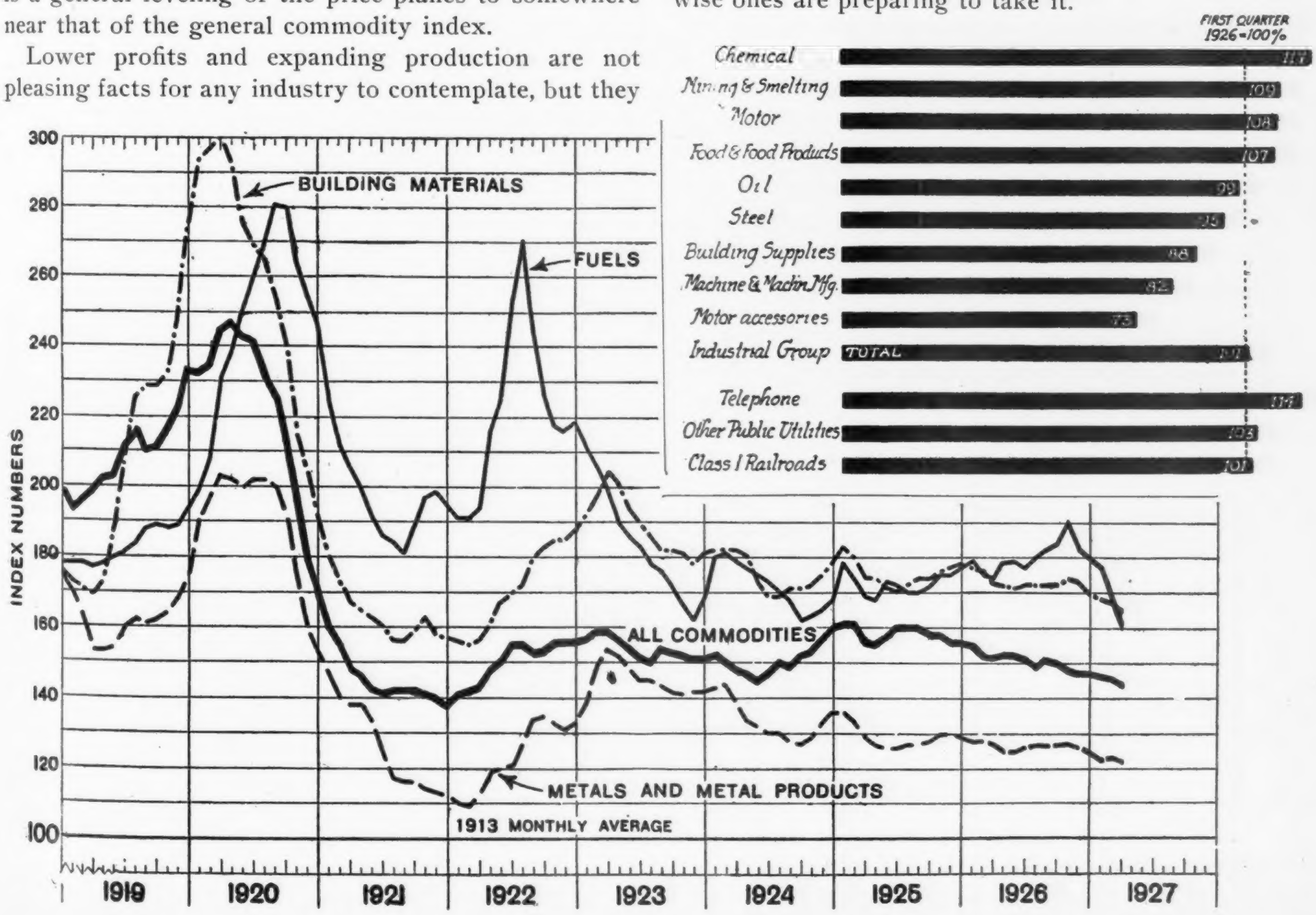
Production of rock products building materials for the first quarter of 1927 is appreciably ahead of production for the first quarter of 1926, notwithstanding an abnormally rainy and backward season. Profits of 164 typical manufacturing and mercantile companies, according to statistics compiled by Federal Reserve Bank of New York, for the first quarter of 1927 are 1% larger than for the same period of 1926, but there is much irregularity in profits as between different industries, and the building material group shows a loss in profits as compared with 1926. The largest percentage gains in profit in 1927 over 1926 were made by chemical, and mining and smelting companies and food products manufacturers.

Compare the graph herewith, showing percentage profits by industries in the first quarters of 1927 and 1926, with the graph below (from the *Survey of Current Business* of the U. S. Department of Commerce), and it is readily seen that the wholesale prices of building materials have been for several years consistently on a higher plane than the wholesale prices of general commodities (including foodstuffs) and of the products of mines and metallurgy. What is happening, apparently, is a general leveling of the price planes to somewhere near that of the general commodity index.

Lower profits and expanding production are not pleasing facts for any industry to contemplate, but they are facts that every industry does have to face, apparently, periodically, in order to adjust itself to unwarranted, or at least ill-judged, over-expansion of producing facilities.

Various excuses are given to account for the success of promoters; not infrequently articles and editorials in business journals, specifically intended to give truthful representation of the status of the industry and discourage promotion, are seized upon by promoters and so distorted as to serve their schemes. Irrespective of how conservative editors and present producers are in their statements in regard to business prospects, practically the sole reason for successful promotion is and always will be the ability of the promoter to demonstrate that the industry as a whole is profitable.

Hence, consistent profits in any industry invariably carry the germ of their own destruction. They make possible the only convincing argument to promote new, and possibly unnecessary plants; and they usually are put back into the industry by those who earn them to expand their own producing facilities. Thus a period of lesser profits, while not easy medicine to take, is doubtless a much needed cure for most of the ills of the rock products industries at this particular time; and the wise ones are preparing to take it.



RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS (Continued)

Stock	Date	Par	Price Bid	Price Asked	Dividend Rate
Riverside Portland Cement Co.	May 9	....	165	....	
Rockland and Rockport Lime Corp. (1st preferred)[34]	June 3	100	103	....	3½% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (2nd preferred)[34]	June 3	100	60	....	3% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (common)[34]	June 3	No par	50	55	1½% quar. Nov. 2
Sandusky Cement Co. (common)[1]	June 8	100	125	135	$2 qu. April 1
Santa Cruz Portland Cement Co. (bonds)[5]	June 1	....	106	107	6% annual
Santa Cruz Portland Cement Co. (common)[5]	June 1	....	85	90	$1 quar., $1 ex. Jan. 1
Schumacher Wallboard Corp. (common)	Mar. 26	....	27¼	27¾	
Schumacher Wallboard Corp. (preferred)	Mar. 26	....	27¾	....	
Southwestern Portland Cement Co. (units)	May 11	....	205	....	
Superior Portland Cement, Inc. (Class A)[30]	May 31	....	44¾	45½	
Superior Portland Cement, Inc. (Class B)[30]	May 31	....	22½	....	
United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27]	June 3	100	98	100	
United Fuel and Supply Co. (sand and gravel) 6% gold notes[27]	June 3	100	98	100	
United States Gypsum Co. (common)	June 8	20	97	97	40c quar. June 30
United States Gypsum Co. (preferred)	June 8	100	122	122	1¾% quar. June 30
Universal Gypsum Co. (common)[3]	June 8	No par	6½	7	
Universal Gypsum V.T.C.[3]	June 8	No par	5½	6½	
Universal Gypsum Co. (preferred)[3]	Nov. 23	....	73	77	1½% Feb. 15
Universal Gypsum and Lime Co. (1st 6's, 1946)[3]	June 8	100	....	96	
Union Rock Co. (7% serial gold bonds)[18]	May 31	....	99	101	
Upper Hudson Stone Co. (1st 6's, 1951)[32]	May 24	....	93	....	
Upper Hudson Stone Co. (1st 6's, 1937)[32]	May 24	....	104	....	
Vulcanite Portland Cement Co. (7½% bonds, 1943)[32]	May 24	100	98½	101	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940)[15]	June 8	100	98½	101	
Wolverine Portland Cement Co.	June 7	10	7	7	15c quar. May 16
Yosemite Portland Cement Co.	May 11	....	7½	....	

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Dividend rate
Atlanta Shope Brick and Tile Co.[1]	Nov. 24	....	25c	....	
Benedict Stone Corp. (cast-stone) (50 sh. pfd. and 390 sh. com.)[1]	Dec. 29	....	$400 for the lot	....	
Blue Stone Quarry (60 shares)[2]	Mar. 16	....	$10¼ for the lot	....	
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	....	12½	....	
Coplay Cement Mfg. Co. (preferred) (1)	Dec. 30	....	70	....	
Eastern Brick Corp. 7% cu. pfd.) (1)	Dec. 9	10	40c	....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	....	
Edison Portland Cement Co. (common)[4]	Sept. 11	50	20c	....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	....	
International Portland Cement Co., Ltd. (preferred)	Mar. 1	....	30	45	
Globe Phospate Co. ($10,000 1st mtg. bonds, $169.80 per $1000 paid on prin.)	Dec. 22	....	$50 for the lot	....	
Iroquois Sand & Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.) (1)	Mar. 17	....	$12 for the lot	....	
Limestone Products Corp. (150 sh. pfd., $50 par, and 150 sh. com., no par)	Dec. 22	....	$60 for the lot	....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	....	104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	....	....	£1⅝	
Phosphate Mining Co. (1)	Nov. 24	....	1	....	
River Feldspar and Milling Co. (50 sh. com. and 50 sh. pfd.) (1)	June 23	....	$200 for the lot		
Rockport Granite Co. (1st 6's, 1934)[2]	Aug. 31	....	90	....	
Simbroco Stone Co.[2]	Apr. 20	....	12	12	
Southern Phosphate Corp.[6]	Sept. 15	....	1¼	....	
Tidewater Portland Cement Co. (3000 sh. com.)	Dec. 22	....	$6525 for the lot	....	
Vermont Milling Products Co. (slate granules) 22 sh. com. and 12 sh. pfd. (6)	Nov. 3	....	$1 for the lot	....	
Wabash Portland Cement Co.[1]	Aug. 3	50	60	100	
Winchester Brick Co. (preferred) (sand lime brick) (5)	Dec. 16	....	10c	....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore. Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925. (6) Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass.

Dolese and Shepard Earnings

DOLESE & SHEPARD CO., Chicago report a net income of $263,896 for 1926, equal to $13.78 per share as compared with $259,089 or $13.53 per share in 1925. The following gives comparative tabulation for 1926 and 1925:

DOLESE & SHEPARD EARNINGS, 1925 AND 1926

	1926	1925
Operating revenues	$857,411	$876,702
Operating expenses	562,373	570,780
Net operating revenues	$295,038	$305,921
Other income	12,512	1,949
Gross income	$307,550	$307,871
Bond interest and federal taxes	43,654	48,782
Net income	$263,896	$259,089
Net income per share	$13.78	$13.53

International Cement Profits Ahead of 1926

DESPITE predictions freely made at the beginning of this year that cement companies would suffer throughout 1927 from an alleged overexpansion in the building trades and through the inroads of foreign competition, International Cement Corp. thus far has run counter to these predictions and seems in a fair way to enjoy a year in which net earnings will be at least equal to, if not in excess of, those of 1926. Estimates from authoritative circles place the probable net for the second quarter, ending June 30, in the neighborhood of $1,200,000, equal to approximately $1.50 a share on the 562,500 shares of common stock outstanding. This would compare with net earnings of $1,058,000 in the second quarter of 1926.

Earnings in the first four months of 1927 ran slightly in excess of the corresponding months of 1926. In the first three months net amounted to $906,292, equal to $1.31 a common share, as compared with net of $746,100 or $1.14 in the similar period last year. First quarter operations were greatly helped by the mild weather conditions which prevailed over most of the period. Shipments and orders are topping those of 1926.

Recently there has been a considerable increase in cement importations to the United States, particularly from Belgium. International Cement to protect its interests has found it necessary in competing with the foreign importers to cut its prices in several of the coastal territories. This price adjustment has resulted in a considerable increase in shipments over last year, which has allowed the company to maintain and possibly increase its earnings despite the smaller profit per unit.—*Wall Street News* (New York).

North American Cement Earnings

THE following compares the 1926 and 1925 earnings of the North American Cement Corp.:

NORTH AMERICAN CEMENT CORP. EARNINGS, 1925 AND 1926

Calendar years—	1926	1925
Net sales	$6,095,888	$6,154,584
Cost of sales	3,827,906	3,331,993
Gross profit	$2,267,982	$2,822,591
Selling and other expense	776,021	838,406
Amount of disc. and bonds		40,083
Depreciation and depletion	477,502	442,065
Net profit	$1,014,459	$1,502,037
Miscellaneous earnings	68,453	50,687
Net earnings before int. and federal taxes	$1,082,912	$1,552,724

Colored Finish Plaster

THE United States Gypsum Co., Chicago, has brought out for distribution an attractively printed and illustrated booklet on "Plastint," a colored finish plaster for obtaining rough-texture wall finishes recently developed by the company. In addition to color plates showing the plaster used in modern textured wall decoration, there are given directions for mixing and application along with illustrations showing application stages.

Pennsylvania Crushed-Stone Producers Meet

Youngstown Gathering Discusses National Association Plans and Finances

A WELL attended meeting of the Pennsylvania Stone Producers' Association was held in Youngstown, Ohio, on May 27 in the club rooms of the Youngstown Club. The guests of honor were Otho M. Graves, president, and A. T. Goldbeck, director, Bureau of Engineering, National Crushed Stone Association. Aside from a general get-together, the main purpose of the meeting was to give President Graves and Mr. Goldbeck an opportunity to more definitely outline their views as to the brand of co-operation that should be had between local associations and the national body, with especial reference to the collection of dues.

Need of Association Laboratory Stressed

Mr. Graves went into detail in explaining the problems of the national association and made an appeal to the group that help be given to make possible the establishing of a testing laboratory so badly needed in Mr. Goldbeck's work. Such a laboratory will cost approximately $20,000 and will require $10,000 per year for proper maintenance; the $10,000 per year, however, he explained, must be assured before going ahead with the establishing of the laboratory and the local associations can help most in bringing this about by co-operating with the national association in getting from their members the tonnage-basis assessment agreed upon at the last national convention. This, Mr. Graves suggested, could be done by urging members to pay their national association dues through the local organization; or, if preferred, directly to the national.

Mr. Goldbeck made a very interesting talk on research in general and told something of its history and results. What he had to say comprised a most convincing sales argument in favor of research work by the association; and he was positive in his statement that a testing laboratory is an absolute necessity to thorough research work. He also told of the work he has done thus far in publishing bulletins for distribution not only in the crushed stone industry but among contractors, engineers and architects. There have been many occasions on which he has been called in on conferences, relative to specifications, between members of the association and state highway departments, most of which have resulted in a closer harmony and understanding.

Group Pledges Support

Those members of the Pennsylvania group present, were unanimous in pledging their support to the national association. The group is now comprised of only seven members, whereas a year ago there were twelve. It was pointed out that it will be difficult to make good their pledge, or guaranty, of $6000 per year to the national association but it was agreed that the pledge continue to be effective. In 1926 the association's production was 424,832 tons of road stone.

Following a luncheon in the clubrooms the party was taken in automobiles to the plants and quarries of the Bessemer Limestone & Cement Co., Carbon Limestone Co. and Lake Erie Limestone Co. These plants are located in the Hillsville-Bessemer district, about 10 miles across the Ohio-Pennsylvania line from Youngstown. It has become the habit with members of this organization to visit each other's operations in this manner, and it is their unanimous opinion that much good has been and can be derived from it.

The officials of the Pennsylvania Stone Producers' Association are: W. M. Andrews, president; F. C. McKee, vice-president, and J. C. King, secretary and treasurer.

A few members of the party "snapped" while visiting the quarry of the Carbon Limestone Co. From this plant the party went to the Lake Erie and the Bessemer plants

The present member companies of the Pennsylvania Stone Producers' Association are: Bessemer Limestone & Cement Co., Youngstown, Ohio; Carbon Limestone Co., Youngstown, Ohio; Grove City Limestone Co., Grove City, Penn.; Kittanning Limestone Co., Kittanning, Penn.; New Castle Lime and Stone Co. (and affiliated companies); Templeton Limestone Co., Templeton, Penn., and West Penn Cement Co., Butler, Penn.

Discussion of Specifications

There was a general discussion of state specifications, grades of stone, sales policies and advertising plans, and it was agreed that before any attempt be made (at any time) to change state specifications, Mr. Goldbeck be consulted. It was also agreed that a close co-operation be effected between producers in the eastern and western part of the state.

Relative to advertising, Secretary King suggested that the association carry advertising space in the Yearbook of the Pennsylvania County Commissioners' Association. The suggestion was made into a motion, and it was voted to use a half page, effective with the next issue, in which all members of the association would be listed. It was also agreed to obtain a supply of Mr. Goldbeck's bulletin, "The Bulking of Sand and Its Effect on Concrete," as well as future bulletins, for distribution among contractors, engineeers and state highway officials. Mr. Graves pointed out that the bulletin may be obtained from the national association at actual cost.

Those in attendance at the meeting were: R. H. Albright, Grove City Limestone Co.; Wm. M. Andrews, Lake Erie Limestone Co.; M. Z. Bentley, Carbon Limestone Co.; O. J. Binford, West Penn Cement Co.; W. E. Bliss, Bessemer Limestone & Cement Co.; W. W. Duff, Lake Erie Limestone Co.; Fred O. Earnshaw, Carbon Limestone Co.; George M. Earnshaw, Rock Products; Walter E. Edwards, Rock Products; Harry Filer, Grove City Limestone Co.; Ellwood Gilbert, New Castle Lime & Stone Co.; A. T. Goldbeck, National Crushed Stone Association; Otho M. Graves, National Crushed Stone Association; H. W. Heedy, Lake Erie Limestone Co.; Judson C. King, Carbon Limestone Co.; N. E. McFadden, Reinhold & Co. (Pittsburgh, Penn.); F. C. McKee, West Penn Cement Co.; P. B. Reinhold, Reinhold & Co; J. W. Smith, Bessemer Limestone & Cement Co.

Waukesha Lime & Stone Co. To Be Sold to Employes

H. W. HALVERSON, the present manager, and three other employes will purchase the Waukesha Lime and Stone Co., of Waukesha, Wis., from the estate of John O'Laughlin of Racine, according to the *Milwaukee* (Wis.) *Journal*. The assets of the company are estimated at about $1,000,000. The contract has been signed and the future owners have made application for permission to issue $500,000 worth of bonds. Final arrangements await the Racine county court's approval of the transaction.

Colorado's New Law and Cement Plants

THE Colorado legislature recently passed a law which Governor Adams signed, reducing the number of hours that any employe may work in the manufacture of cement and plaster to 8 hours daily. When the law was passed the United States Gypsum Co., operating near Loveland, Colo., informed the state industrial commission that some of its employes had been working 10 hours a day, but were paid on an hourly basis, while others worked straight eight hours. The question was then asked if it was necessary to give a 30-day notice before it could reduce the pay of the 10-hour men down to an eight-hour basis, the law requiring a 30-day notice on intended salary changes. The commission answered that the law automatically reduced the wages of the 10-hour men; that they must now work eight hours and be paid accordingly.

As a result of the passing of the new law it was found necessary to rearrange the time schedule at the cement plant of the Colorado Portland Cement Co. at Portland, in order to incorporate an eight-hour working shift instead of 12 as was formerly the case.

The state industrial commission has been asked to decide whether or not the new statute will affect the total daily wage paid such employes. The working day in such plants has been 10 hours. Chairman Thomas Annear of the commission has asked the officials of the companies affected to present a formal statement of facts, after which he will then render a written opinion.

A State Cement Plant for Texas?

THE Texas senate recently adopted a resolution, introduced by senator Walter C. Woodward of Coleman, requesting the state board of control and the highway commission to make an estimate of the probable cost of constructing a state cement plant for the manufacture of cement to be used in road construction, and to submit the estimate to the legislature with the view of an appropriation being made for the purpose. The resolution reads in part:

"Whereas for a number of years to come it seems that concrete for the purpose of building state roads will be greatly in demand, and

"Whereas the state now has no cement manufacturing plant, and

"Whereas the state has adequate and sufficient labor in the state penitentiary to operate a cement plant for the purpose of manufacturing cement for state use on public roads and elsewhere.

"Therefore, be it resolved by the Texas senate that the board of control and highway commission together make an estimate as to the approximate cost of a cement plant and determine as nearly as possible the actual cost to manufacture cement and just what it can be furnished to the state for the purpose above mentioned, and further advise if they deem feasible the construction of a cement plant, a possible location for same and probable saving to the state and the various counties of the state because of the building of said plant, and further furnish this information at the earliest date possible in order that the senate may be advised, and if this cannot be done at this session, then that they prepare and have the same ready to submit to the senate at the next convening of the Texas legislature."

The resolution follows in line with the policy outlined by Governor Moody, who is of the opinion that the highway commission and the penitentiaries should be combined under one head, thereby doing away with political office seekers and grafters, the convicts supplying the necessary labor for the operation of the cement plant and the highway department furnishing the outlet for the finished product.

Phosphate Loading Plant for Nauru

THE British Phosphate Commissioners have placed an order with Henry Simon, Ltd., conveying engineers, Manchester, for an extensive ship-loading plant and handling and storage equipment for dealing with the huge deposits of phosphate of lime which are to be found on the island of Nauru and on Ocean Island in the South Pacific. The extent of the deposits available on the two islands is estimated at about one hundred million tons. The two islands formerly belonged to Germany, but were taken over by Great Britain during the war. The great difficulty experienced has been to load the phosphate to ships, owing to the fact that there are no harbors. The *Chemical Age* states that, in order to improve the loading facilities and to increase the rate at which the phosphate can be handled, Henry Simon, Ltd., are to install an up-to-date mechanical loading plant on both islands. The bulk of the work is to be done at Nauru, where mechanical conveyors are to be installed to bring the phosphates from the quarries to the shore, and a large building capable of holding 12,000 tons of the valuable material is to be erected. The phosphates will be loaded direct to ships by means of two huge swinging cantilever arms, reaching out 200 ft. over the sea. Each cantilever will carry a loading-out conveyor, and will be capable of handling 300 tons of phosphate per hour. At Ocean Island a considerable amount of plant already exists, and here a new handling plant and a big loading jetty, 350 ft. long, is to be installed to work in conjunction with the existing mechanical conveyors. The plants on both islands will be electrically driven throughout; this equipment is also included in the contract.—*Fertilizer and Feeding Stuffs Journal,* London.

New Gravel Dredge Put in Operation in Panama

A NEW method of reclaiming sand and gravel for use in cement work was inaugurated recently, when a pipe line suction dredge assisted by the relay pump barge began delivering gravel to the stock pile at Gamboa through a pipe line approximately 5000 ft. long and over a maximum elevation of 45 ft.

A new plant for washing the gravel and screening it into sizes has also been built to the north of the Chagres river and east of railway tracks at Gamboa. This plant has been in operation since the latter part of October, 1926, and is soon to be supplemented by a rock crusher for those sizes over 3-in. which constitute about one-seventh of the total run of bank gravel and which otherwise would go to waste.

About 50% of the demand for gravel is for run of bank, consequently stock piles of this grade have been established at Balboa and Cristobal. For these stock piles a sufficient quantity of gravel directly from the original deposit in the Chagres river will be secured during the operation of accumulating a stock pile at Gamboa by loading cars at the end of the dredge's discharge line.

Formerly gravel was secured by dredging into barges, towing to Gamboa, unloading into cars and hauling to stock pile. The new method will result, it is estimated, in a saving of 50 cents a cubic yard, or about 40%, and in addition valuable sanitary work will be accomplished without additional cost. —*Panama Canal Record.*

Asbestos Shingles Held Free of Duty by Customs Court

A LENGTHY decision has just been handed down by the United States Customs Court involving the correct tariff treatment of certain asbestos shingles imported by Stone and Downer Co., D. C. Andrews and Co. of Boston, J. W. Hampton, Jr., and Co. of Philadelphia and New York, the American Insulation Co., Ellis G. Friedman, Inc., of New York, R. B. Fontaine of New Orleans, Hawley and Letzerich, W. L. Conover of Galveston and McGiffin and Co. of Tampa.

On entry, duty was levied on the shingles in question at the rate of 25% ad valorem under paragraph 1401, 1922 tariff law, as manufactures of asbestos. Judge McClelland, in summarizing the court's conclusions in the importers' favor, holds that, it being established that the term "shingles" has a commercial meaning different from the ordinary or common meaning thereof, and within such commercial meaning asbestos shingles are included, the shingles, the subject of this ruling, should have been admitted free of duty under the provision for such articles in paragraph 1660 of the 1922 act. The collector's classification under said paragraph 1401 is therefore set aside. (Protests 16467-G-12588, etc.)

Eighty-Ton Dynamite Blast at John T. Dyer Quarry Co.

AN unusual quarry shot, and one which attracted attention all over the East among explosives experts and stone men, took place on the afternoon of Monday, May 30, 1927, at the John T. Dyer Quarry Co. quarries near Birdsboro, Penn.

Approximately 170,000 lb. of 60% and 75% quarry gelatin dynamite were used. About 1,000,000 tons of rock were blasted out.

The face of the quarry which was blasted was from 250 to 280 ft. high and about 800 ft. long. Two types of loadings, both well-drill holes and a large coyote hole, were shot at one time. The coyote hole was 105 ft. deep, with six wings, there being three on each side. The total footage was 430 ft.

In back of the quarry face were 23 well-drill holes. These were 8 in. in diameter, the deepest one being 278 ft. There were 16 holes 200 ft. deep and more. These holes were located at the side of the coyote hole, along the fact of the quarry.

Especially large size sticks of dynamite, 7 in. in diameter by 24 in. in length, were manufactured for loading. Each stick weighed 50 lb.

The dynamite was supplied by the E. I. du Pont de Nemours & Co., and S. R. Russell, senior technical explosives man in the field for that company, directed the loading and the firing of the shot. He was assisted by John W. Koster and Edwin T. Wolf, also of the du Pont Explosives Department.

Water was used to tamp the tunnel. For this purpose some 80,000 gal. were brought from a nearby reservoir. A carload of stone dust was used for tamping the well-drill holes.

The shot, which was highly successful, was witnessed by a crowd of some 3000 persons, including leading quarry men, explosives experts and visitors from surrounding cities and towns.

It was regarded as the largest quarry shot ever made in the East and the largest quarry shot ever made in hard rock in the United States. It has been exceeded in the amount of explosives used by other quarry shots in the Pacific Coast section, but these were in soft rock with lower grade explosives. It is also believed to be the first time in quarry blasting in the United States that two types of loadings were shot at once. Another unusual feature was tunnel blasting in a quarry face of the height of this one.

The quarry is one of the largest trap rock plants in the country and the stone blasted out is to be used for railroad ballast and concrete aggregate, for road work and general commercial purposes.

The blast attracted a large number of curious spectators, who, judging by the newspaper reports, were somewhat disappointed in the lack of the "spectacular" produced by the blast. An item from the New York *Herald-Tribune* follows:

"Fifteen thousand persons who gathered at the John T. Dyer quarries near Birdsboro today to see one of the largest explosions of dynamite in history missed much of the expected thrill when 80 tons of dynamite was set off.

"Ground within 1000 yards radius shivered perceptibly. There was a low, rumbling sound and a mighty fall of a million tons of rock. But there was little of the tearing, smashing spectacle that many had expected, and a cloud of dust and steam immediately surrounded Monocacy Mountain, hiding most of the falling rock.

"Thousands of automobiles from many sections were handled by a squad of state and highway police, and all spectators were kept behind barb wire fence more than 1000 yd. from the mountain. About 400 yd. from the coyote tunnels that housed the explosives was a galvanized iron dugout, where were grouped officials of the du Pont powder company, including Colonel Coleman du Pont; officials of the Dyer company and a battery of newspaper and camera men.

Over 80 tons of dynamite were recently set off at the John T. Dyer Quarry Co., Birdsboro, Penn. This view was taken immediately following the blast which dislodged about 1,000,000 tons of stone

Cement Orders To Be Divided

THE Alabama State Docks Commission has discontinued advertising for sealed proposals for cement and has adopted a policy of distributing orders among Alabama cement manufacturers on a basis of mill production capacity.

A recent order for 32,500 bbl. for the construction of the pier 2 warehouse was placed with the Phoenix Portland Cement Corp. of Birmingham and the National Cement Co. of Ragland.

New Stucco Plant at San Antonio, Texas

T. W. CARRAWAY, of the Carraway Engineering and Supply Co., acting as trustee for a combination of San Antonio and New York business men, has purchased a building and is having the equipment of the Lyon Stucco Products Co. installed. The stucco plant, recently purchased by these men, formerly was located in Springfield, Ill., but was shipped to San Antonio following its sales and dismantling, Mr. Carraway announced.

The new plant will be located in a one-story building at 125 Blue Star street at the Missouri, Kansas and Texas railroad tracks. The building, covering a ground space of 80 by 90 ft., is now being remodelled.

The new factory will be opened and production started as soon as possible. There will be approximately 15 men employed in the plant in addition to the office force, executives and salesmen.

The plant represents an investment of approximately $40,000. It is said to be one of the most complete and best equipped plants of its kind in Texas and the southwestern United States.

Magnesite and cement stucco will be manufactured in all colors in this new factory. Plastic combinations for bathrooms, floors, drain boards, ornamental casted crocks and lawn ornaments also will be made. The color ingredients will be ground and mixed into these materials at this plant.—*San Antonio* (Tex.) *Light.*

Injunction Granted Against Quarry Owner for Hindering Enjoyment of Property

Important Decision by U. S. Circuit Court of Appeals in Case Involving Slate Granule Quarrying and Crushing Operation in Vermont

W. D. GRISWOLD SMITH, PLAINTIFF-APPELLEE, V. STASO MILLING CO., NO. 238; CIRCUIT COURT OF APPEALS, SECOND CIRCUIT.

THE operation of the defendant's mill hindered plaintiff's enjoyment of his land. The plaintiff sought to enjoin the operation of the defendant's mill. The court held herein that the balance of convenience was to be considered as a determining factor in granting an injunction.

Before Manton, Hand and Swan, circuit judges. The full text of the facts and of the opinion of Judge Hand follows (Legal references omitted):

Appeal from a decree of the district court of Vermont enjoining the defendant from polluting with slate dust a brook running through the plaintiff's premises, from similarly polluting the air, and from jarring his dwelling house by blasting, and awarding plaintiff judgment in the sum of ten thousand dollars for past damages.

The plaintiff is the owner of a summer residence in the town of Castleton, Vt., something less than a mile distant from the defendant's crushing mill. This residence he occupied in substantially unchanged form at the time the defendant bought its land and before it put up its mill.

The defendant blasts slate rock upon its premises, which it crushes, and makes from the product ground slate roofing material. The grinding creates clouds of dust, part of which, when the wind is in the right direction, is carried over to the plaintiff's premses, which it covers with pulverized dust. This is one grievance,

In the defendant's process of manufacture there are waste products which it puts upon a dump by a belt conveyor. Through the conveyor streams of water are run from driven wells, and the thin, muddy or plastic mass flows out into the first of three settling ponds, the overflow from which passes into a second, and so to a third, the three being together designed to retain all the waste.

During heavy rains these ponds become filled with water and carry off through the sluices quantities of the sludge or mud, which the defendant has deposited in them. The last of these empties into a brook which runs through the premises of both parties, and on such occasions quantities of the muddy slate reach the plaintiff's land and leaves a sediment upon it. He uses the brook for part of his domestic water supply, and the sludge or silt fills his reservoirs and otherwise interferes with his enjoyment of the premises. This is another and more important grievance.

Objection to Blasting

The third is the defendant's heavy blasting in the course of its work, which at times has been violent enough to break the plaintiff's windows, and at others to shake the whole house. This was more serious three years before the trial, when it occurred not only during the day, but at night.

After the defendant had purchased the land, but before it had put up the plant, the plaintiff wrote, calling attention to the brook which flowed through both premises, advising it that its continued purity was a valuable asset to him, and protesting against any pollution or interference with its flow.

The defendant's superintendent called upon him, assured him that there was no danger, because the proposed system of filters and settling basins would prevent any such possibility. The assurance was several times repeated. After the erection of the mill the defendant again assured the plaintiff more than once that the trouble had been in the management of the settling ponds.

The defendant has installed dust arresters which are rated to stop 99% of the dust which is produced. It has invested about $1,000,000 altogether in the plant, employs between 125 and 200 men, and its monthly pay roll is between $25,000 and $40,000.

The plaintiff valued his premises at $40,000, though it cost in all less than $30,000, but the defendant's witnesses put its value at between $10,000 and $15,000. He had rented part of the land before the trial, and after the defendant's operations were under way, for $150 a season. It is available for a summer residence, and, if a proper tenant could be found, the rental would be much greater.

District Court Enjoined the Quarry Operator

The district judge on conflicting evidence found for the plaintiff on all the questions of fact involved, and absolutely enjoined the activities complained of. He fixed the damages from the first operation of the mill in 1917 until February, 1924, at $10,000, for which he allowed judgment. The defendant appealed.

Hand, circuit judge (after stating the facts as above)—As this case concerns the enjoyment of land in the state of Vermont, and depends upon the relative interests of two landowners, we are to decide it in accordance with the common law of that state, so far as it is disclosed by the decisions of its highest court.

So far as we can find, however, the Vermont decisions are no different, as respects the rights of riparians, from the general law. The defendant, while not using the brook directly, has created in its neighborhood deposits of sludge which were not there in a state of nature.

When in ordinary course this is carried into the brook through the settling beds, it is the equivalent of directly defiling the stream itself, becomes a wrong and subjects the defendant to some form of action, either at law, in equity, or both. That the injury here done is not so trivial that the law will ignore it, is too apparent for discussion.

The defendant, not arguing that the facts justify no relief, insists that no injunction should go, because of the disastrous effect upon his crushing mill, which must stop its operation if enjoined. We are not satisfied that this must be the consequence, but we are content so to assume. The plaintiff argues that those cases in which such considerations have prevailed, do not represent the law of Vermont, which has never balanced the comparative hardships of the continued wrong and the injunction, when the plaintiff's right is substantial and clear.

* * * * * *

Balance of Convenience Is Reasonable Law

Assuming that the doctrine is not fixed in the law of Vermont, we think that it is as matter of principle a reasonable one. The very right on which the injured party stands in such cases is a quantitative compromise between two conflicting interests. What may be an entirely tolerable adjustment, when the result only to award damages for the injury done, may become no better than a means of extortion if the result is absolutely to curtail the defendant's enjoyment of his land.

Even though the defendant has no power to condemn, at times it may be proper to require of him no more than to make good the whole injury once and for all. If the writ went as of course, we should have no option. Notoriously it does not; it goes *ex debito justitiae*, and is discretionary if any is.

To say that whenever an injured party can show that he could recover damages, he has

only in addition to prove that the tort will be repeated appears to us to ignore the substance of the situation in the interest of an apocryphal consistency. Where we are not bound by the local law, we decline to adopt so rigid a canon.

Nevertheless, so far as concerns the pollution of the stream, we think that the injury is so substantial and the wrong so deliberate, that we ought to impose upon the defendant the peril of any failure successfully to avoid it.

In the case at bar not only did the defendant have the most explicit warning from the plaintiff, but it gave an equally explicit assurance that it could avoid defiling the brook. It has several times repeated that assurance after occasional overflows.

Execution of Promise Imposed on Defendant

If the plaintiff had filed his bill before the mill was built, the balance of convenience would have been different, and we should not have hesitated to stop what as yet remained only a project. Whether the assurances in fact determined his inaction we need not say; he has shown himself pertinacious, though forbearing, and the chances are that they did.

Even if not, these preliminary negotiations seem to us enough absolutely to impose upon the defendant the execution of what it promised. As respects the pollution of the stream, we therefore think that the injunction should remain absolute, and that the defendant must find some way to avoid further injury, or make its peace with the plaintiff as best it can.

As regards the dust the facts are different. True, it is equally a tort so to defile the air. But the injury is less oppressive, and neither the plaintiff's original protest, nor the defendant's promise, covered it.

Efficiency of Dust Arresters Involved

We are not prepared in such a situation to say that, if the defendant cannot by the best known methods arrest all the dust which it emits, it must shut down its mill. The record shows that it has installed arresters which are designed to stop all but 1% of the dust, and apparently do so. Yet that which escapes is still enough to affect the plaintiff's enjoyment, and the record does not show beyond question that the defendant cannot prevent it.

The best disposition of the case is to affirm the injunction as it stands, but to give leave to the defendant to apply at the foot of the decree for relief upon showing there are no better arresters extant, that it operates those it has, at maximum efficiency, that it is therefore impossible further to reduce the dust, and that if the injunction continues it has no alternative but to stop operation.

If that be proved to the satisfaction of the district judge the injunction should be modified so as merely to limit the dust to that which will escape the arresters now in use.

Modify Decree to Forbid All Blasting at Night

The cases are not many which touch upon the injury done by blasting where no trespass is involved by throwing dirt and stones upon the adjoining premises, and we find nothing in Vermont reports on the subject.

The situation is again one where conflicting interests must be compromised.

The decree, as it is, forbids any jarring or shaking of the house; it is too broad. It should be modified to forbid all blasting at night while the house is occupied, and at all times with such heavy charges as break windows, or unreasonably jar the house.

There remains only the question of damages. We cannot accept the estimate of the district judge as to the value of the plaintiff's premises, which rests only upon his own appraisal, contradicted by the defendant's witnesses, who were surely in a more impartial position. A country residence, on which so much is spent to suit the owner's fancy, cannot be said to have a value equal to its cost.

Nor is it fair to take the price which it might bring from a purchaser whom it might chance to please. Its value is what it will fetch, and, while any appraisal is at best scarcely more than a guess, we think that $15,000 is upon this record the most that we can give to it.

The damages are even more troublesome to fix than the value. We must take it that the operation of the mill has prevented the plaintiff from leasing his property as a residence and converted its value into merely agricultural land, but we have no right to say that he would have been able to lease it, had the mill been absent.

On the other hand, the injury went on for seven years down to the time of the last amendment. It appears to us than an award of $500 a year is as much as the evidence will warrant. The damages are therefore fixed at $3,500.

The defendant should bear the costs in both courts. The decree is modified as indicated above, and the cause remanded with instructions to proceed in accordance with the foregoing opinion.

April 4, 1927.

Officers of the National Lime Association

WE noted the election of J. M. Gager, of the Gager Lime and Manufacturing Co., Chattanooga, Tenn., as a regional vice-president of the reorganized National Lime Association, in ROCK PRODUCTS, May 28, 1927, p. 83, but at the time the paper went to press we did not have a portrait of Mr. Gager to accompany those of the other four regional vice-presidents. Mr. Gager has ever been one of the most active and progressive members of the association, and under his leadership Southern lime manufacturers are expected to organize in energetic fashion.

J. M. Gager, regional vice-president of the National Lime Association

Milton McDermott, treasurer of the National Lime Association

Another national office in the National Lime Association went to a Southern producer—Milton McDermott, of the Knoxville Sand and Lime Co., who has been elected treasurer. Mr. McDermott has been active not only in the National Lime Association, but in the National Sand and Gravel Association, and has a wide circle of friends in both industries.

Southwestern Division, N. C. S. A. Holds First Annual Meeting

THE Southwestern District Association of the National Crushed Stone Association held its first annual meeting at the Adolphus hotel in Dallas, Texas, on June 1st. The district association includes producers from four states, Arkansas, Oklahoma, Texas and Louisiana, but with the exception of President Wise, who is both a Texas and an Oklahoma producer, only Texas producers were present.

This being an annual meeting, there were a certain number of formalities to be gone through with, but the time for these was cut to the minimum by having reports mimeographed and sent to the members in advance. The treasurer's report showed the association to be in excellent shape financially with all dues paid and a sufficient balance in the treasury to continue the program that has been planned.

How the Association Began

President Wise called on R. J. Hank, the secretary-manager, for a report of the year's progress. Mr. Hank began with a brief resumé of the history of the association, whose organization was given a temporary form at a meeting held in Austin, Texas, in April, 1926. Through correspondence the attendance of other companies not represented at first was obtained and the organization was made permanent at another meeting held in Austin, June 15, 1926. All those present had continued as members with the exception of two companies, the Bromide Crushed Rock Co. and the Jackboro Stone Co. The Bromide company had been forced out of business by the burning of its plant a few months ago, and the plant has not yet been rebuilt.

One new member company had been added, the James Stone Co. of Corsicana, Texas. Charles Schoenfeldt, of San Antonio, who is building a crushed stone plant near that city had expressed his wish to become a member of the association as soon as the plant was ready to produce.

The membership now represents an actual production of 1,735,000 tons and a higher tonnage is expected for the present year.

Association Accomplishments

Several things have been accomplished by the association acting as a unit. One of the most important has been the arrangement made with the state highway department to place inspectors at plants wherever the tonnage shipped was sufficient to justify the cost of plant inspection. This arrangement had been made recently and the first inspector had been appointed to New Braunfels where three member companies have plants.

Another important arrangement made with the department was one by which the state would prepay freight on material intended for use on state highways. The railroad companies had expressed their willingness to receive cars with this understanding. Such an arrangement was in force previously but during the latter part of the Ferguson administration the railroads (or some of them at least) refused to transport state highway material without the freight being prepaid.

R. J. Hank

Need of Research

The secretary thought that the greatest possible use should be made of the research activities of the National Crushed Stone Association, and he believed that, in addition, the district association should give some attention to research of local importance. One matter that needed clearing up was the amount of dust that should be permitted in concrete aggregate. There is a wide difference of opinion among engineers as to how much dust may be permitted without injury to the strength of the concrete. In some cases it had been claimed that considerable amounts of dust actually increased the strength over what the concrete from the same materials tested with the dust removed.

There should also be research on bituminous types of roads, the secretary said, to show the superiority of crushed stone over gravel in these types. This research ought to comprise a survey of bituminous types of highway in the state, published in illustrated form with photographs showing the condition of roads after various lengths of service with certain densities of traffic. He thought that such a survey should first be made by the association whose findings should then be presented to the state highway department for confirmation.

In closing, the secretary touched upon the fact that influence was apparently at work to ask that the highway department produce material by installing local crushers. In a state like Texas in which there are large areas far from commercial plants or even railroad communication this might be justified in some cases, but it certainly could not be justified where the material could be obtained from a commercial plant at a lower cost (including the freight) than a local crusher could produce it.

Distributing N. C. S. A. Publications

President Wise said that at a directors' meeting arrangements had been made to mail out the research bulletins of the National Crushed Stone Association, and the first of these bulletins, which treated on the bulking of concrete sand, was now ready for distribution. The directors had appropriated money to distribute these bulletins to county highway engineers, construction engineers, architects and leading contracting firms. In addition the association would order copies for members to distribute to lists of their own customers where this was desirable. A list of those to whom publications were to be sent would be furnished to members so as to avoid any duplication of names.

Mr. Wise said that this arrangement had been made at the time Mr. Goldbeck visited the southwestern states. A report of this visit and the work of the directors at the time had been sent to the members.

Prepaying Freight

The practice of prepaying freight on stone shipped to contractors as a sales method caused some rather lively discussion. It was said that certain contractors had been successful in financing themselves at the expense of producers by reason of this and similar practices. So long as a contractor could finance his payrolls he looked to the material man to do the rest. To illustrate the way some contractors do business without proper financial backing, a case was mentioned of a contractor who could not meet a note for a comparatively small sum at the same time that he had taken on more than $1,000,000 worth of new work.

One member gave his experience with prepaying freight, which was essentially an arrangement by which the contractor was to pay 6% interest on money advanced for freight. The freight bills accumulated until the amount was large enough to be burdensome. The contractor admitted he was letting his freight bills ride because he only had to pay 6% interest on them and he was using the money to take up 8% paper elsewhere.

No action whatever was taken by the meeting, but it seemed to be the sense of the meeting that the practice of advancing freight to such an extent was a vicious one, as in many cases the freight considerably exceeded the amount received for the material itself.

Discussion of Research

President Wise brought up the question of research which might be conducted by the association and opened the discussion by saying that the fullest use should be made of the work of the National association. It was not at all desirable to duplicate any research work being done by the National association. He believed the most valuable aid that the National association could furnish its members was the research and survey work of Mr. Goldbeck, and he wanted all the members individually to study this work and make use of it.

E. C. Dodson thought there was a necessity for local research, especially to convince engineers that a "50-50" mixture of sand and screenings would give the same or greater strength to concrete when used as fine aggregate. The state highway department permits such a mixture, but all engineers are not satisfied that it is as satisfactory as pure sand.

It was explained that research tests of the kind intended to apply to an individual case were hardly a subject for research by the association as a whole. Mr. Dodson said he understood this to be the case and for that reason was employing an engineer to make such research. But he thought the association might also look into the matter, as it was of so general an interest.

The association then went into executive session and re-elected its officers as follows:

President, W. F. Wise, Stringtown Crushed Rock Co., Stringtown, Okla.; vice president, E. Eikel, Dittlinger Lime Co., New Braunfels, Texas; treasurer, C. Westbrook, Landa Rock Products Co., New Braunfels, Texas. R. J. Hank was reappointed secretary-treasurer for the ensuing year.

Discussion of Grading

After lunch the members reassembled and listened to an instructive talk on the grading of crushed stone for concrete aggregate by Jean N. Knox, consulting engineer, who is now doing some work on the grading of materials made by the Chico Stone Products Co. Mr. Knox brought in samples of the regular sizes of crushed stone made by this company and explained how they could be combined to give concrete of the highest strength and plasticity and at the same time to use the greatest possible proportion of the quarry output.

His discussion was necessarily rather technical, but one of the points he brought out was that by mixing 25% to 30% of sand with the sizes shown, in the proportion in which they were produced by the plant, a mix could be made which was just as strong and just as plastic as the mix made by arbitrary proportions using sand as fine aggregate and stone as coarse aggregate. He had worked out tables of grading and strength to use as much of the quarry output as possible under varying conditions which was explained to the members.

He thought that in the interest of the stone industry the highway department should be asked to begin a series of tests of designed mixes of concrete against the arbitrary mixes provided for in the specifications. If this were to be done an engineer could design mixes so as to use a greater part of the quarry output than is now being used and even better concrete than is being made at present would result.

The members were all interested and asked a number of questions. Mr. Knox answered these and a general discussion of the whole matter of grading followed.

Those present at the meeting were:

W. F. Wise, Stringtown Crushed Rock Co., Stringtown, Okla.

T. F. Sharp, Texas Trap Rock Corp., San Antonio.

E. Eikel, Dittlinger Lime Co., New Braunfels.

Max Altgeld, New Braunfels Limestone Co., New Braunfels.

C. Westbrook, Landa Rock Products Co., New Braunfels.

A. S. Goetz, Thurber Earthen Products Co., Tiffin.

E. C. Dodson, Chico Stone Products Co., Dallas.

E. C. Vickers, Chico Stone Products Co.

R. J. Hank, secretary-manager, Austin, Texas.

J. N. Knox, consulting engineer, Dallas.

Edmund Shaw, Rock Products, Chicago.

W. S. James of the James Stone Co., Corsicana, and I. W. Hall of Hall Bros. Crusher, Brownwood, Texas, sent regrets that they were unable to be present.

Monmouth Company Opens New Gravel Plant at Howell, N. J.

THE recently completed $75,000 sand and gravel plant of the Monmouth Washed Sand and Gravel Co., Howell, N. J., was put into operation, following an official opening attended by the company officials, local business men, machinery manufacturers' representatives and others. The new plant has a capacity of about 700 tons per 10-hour day.

Operations are carried on by means of a slack-line cableway system, equipped with a 1-yd. bucket. At present the area to be worked out is about 450 ft. from the plant, but will be extended when needed. The cableway and all equipment for it except the hoist was furnished by the H. O. Penn Machine Co., New York. The hoist was purchased from the National Hoisting Engine Co., Harrison, N. J.

Washing water is obtained from a brook about 1600 ft. distant. A 150-g.p.m. pump operated by a 10-hp. electric motor pumps the water to a 27,000-gal. reservoir near the plant, from where it is drawn as needed. The wash water is returned to the reservoir and re-used before being allowed to run to waste. The pump drawing the washing water from the reservoir has a capacity of 300 g.p.m.

The 38-acre deposit was prospected and showed about 40 ft. of fine gravel and sand. In places a good grade of mason's sand is found at a great depth. This can be used without washing, it is said. At present the plant is making two sizes of gravel and two sand separations, mason's and concrete. The entire plant is electrically operated. Shipments will be made over the Pennsylvania railroad, a spur from the main line being under construction.

The entire plant was designed and built by the Smith Engineering Works, Milwaukee, Wis., who furnished much of the equipment for it.

The officers of the company are: President, George E. Fournier, New Monmouth; vice president, Patsy Sarabuchello, Matawan; treasurer, Frank A. Federici, Freehold; secretary, Louise Vanauken, Freehold. The directors are: Mr. Fournier, Mr. Sarabuchello, Miss Vanauken, Mr. Federici, J. Allocco, Matawan, and Armand J. Fournier of Freehold.—*Asbury Park* (N. J.) *Press.*

Missouri Amiesite Company to Open New Plant

ESTABLISHMENT of a plant of the Missouri Amiesite Co. in Cape Girardeau, Mo., was formally announced as construction work started on the building which will house the equipment and machinery.

The plant, which with its equipment will cost $70,000, will be located on a site of the Hely Stone Co., on South Kingshighway, east of the present Hely plant. The company will engage exclusively in the manufacture of Amiesite, a street and road surfacing material, which is used in the East.

James Moore of St. Louis, who is to be superintendent of the local plant, expects to get it in operation by June 20. The plant will have a capacity of 600 tons per 10-hr. day and will employ 10 to 15 men.

The plant was located in Cape Girardeau because of the high quality of the limestone rock taken from the Hely quarry, according to Mr. Moore. This rock forms the base for the surfacing compound. The Hely company will provide the stone from its quarry only a short distance away.

The product will be manufactured as needed, and will be loaded in cars directly from the plant. A switch of the Frisco railroad is being extended to the plant.—*Cape Girardeau* (Mo.) *Missourian.*

Missouri Portland Announces Improvement Plans

ANNOUNCEMENT has been made by the Missouri Portland Cement Co., Post Dispatch Bldg., St. Louis, Mo., through Vice-president C. A. Homer, of a proposed $2,000,000 expansion program for its wet process cement plant at Prospect Station, St. Louis.

The expansion program includes plans for the erection of a 400 x 40 ft. structural steel and reinforced concrete kiln building with corrugated asbestos sidings and roof and three batteries of concrete cement storage silos, each battery to consist of two conjoined silos.

The plans have been placed with the F. L. Smidth & Co., engineers of New York, and preliminary ground work has been started. Construction is expected to be completed by April 1, 1928.

Three Forks Portland Prospects Deposits

UNDER the direction of J. C. Capper, manager of the Hanover, Mont., plant of the Three Forks Portland Cement Co., tests are now being made of the structural formation of seven different hills supposed to contain gypsum and cement rock in large quantities. One of these seven tests has already been completed, according to the *Helena* (Mont.) *Record*.

A series of eight holes, drilled to a depth of 50 ft. and at 50-ft. intervals, are being placed across the face of the hill, and from the cores removed, accurate data on the formation and character of the rock will be gathered. This will be used to decide whether the particular deposit will be worth quarrying. Actual construction work, such as an electric railway and plant structures, is awaiting the final outcome of these tests. The new development will cost in the neighborhood of $750,000, it is said.

British Sales Arguments for Washed Sand and Gravel Aggregates

A REPORT just issued states that the special concrete aggregates and sands produced by the Herts Gravel and Brick Works, Ltd., derive their merit from two causes—(1) The geological formation from which they are taken, and (2) the care with which they are prepared.

The deposits from which the raw material is taken is the glacial drift which has been deposited by ice on the top of the chalk. These deposits vary in thickness from 25 ft. to 45 ft. They contain material which, when treated by a special process of washing and crushing, is of a very high degree of purity and contains a high percentage of silica. It is considered that the fact that the deposit is of glacial origin and not water borne is of fundamental importance. The varieties of sand manufactured by the company are extremely pure and are carefully graded. They are free from chalk, clay, humus, loam or any organic, animal, faecal or bituminous matter. They are clean and gritty and are almost entirely composed of hard silicious grains.

The aggregates are produced by a careful process of washing, crushing and grading. They are true to specification. They are free from chalk, clay or other impurities. Tests which are reported therein are a complete testimony of their value for the highest class of concrete construction.

The Plant

The present-day requirements for aggregates for making concrete are very stringent, and it is recognized that only the best material is suitable for high-class work.

Accurate grading is a necessity, and at the same time freedom from dirt and foreign matter becomes imperative. To render the raw material, as obtained from the pit, fit for all purposes, a crushing, washing and grading plant of the most up-to-date variety has been installed by the company.

This plant—combining practical knowledge of gravels and sands with the highest engineering skill—ensures that the natural high silica content is maintained in all its purity, and the separation of each size of aggregate is rendered complete.

The method of production not only secures the yield of clean aggregates, both coarse and fine, but produces aggregates of very sharp character, more especially those of an angular character, which permits of bonding in such a manner that the greatest strength and tenacity is obtained.

The cost of concrete making depends very largely on the amount of labor expended upon the work, and this cost is the same whatever the quality of the aggregate. As the quality of the finished edifice is dependent on both the workmanship and the materials used, it is obvious that good work demands good workmanship, and without good materials, good workmanship is wasted. The difference in cost of first and second rate material is, in terms of the finished work, a very small percentage of the whole, and as the use of second-rate materials, other things being equal, must result in second-rate work, the use of the first-class material becomes of first-rate importance.—*The Contract Journal* (London, England).

Large Cement Shipments to North Carolina

THE state of North Carolina is continuing its extensive road program at a rapid rate, according to recent reports. Over 3500 miles of highway have already been built and the end not yet in sight. Large shipments of cement are being received from the National Cement Co., Ragland, Ala., one of the most recent being a 25-car train load. The National company will furnish around 300,000 bbl. of cement to the North Carolina highway commission during the present year.

L. H. Allen Becomes President of Hawthorne Tile Co. of New York

LESLIE H. ALLEN, who for the past three years has geen general manager of the Hawthorne Roofing Tile Co. of Cicero, Ill., and of the Concrete Tile Machinery Co. of Cicero, has resigned these positions and accepted the appointment of president and general manager of the Hawthorne Roofing Tile Co. of New York, 507 Fifth Ave., New York City.

Prior to his connection with the Hawthorne company of Cicero, he was for three years assistant manager of the concrete products bureau of the Portland Cement Association, Chicago, and 11 years with the Aberthaw Construction Co. of Boston, Mass.

Lehigh Portland Dedicates Safety Trophy at Mitchell (Ind.) Plant

THE dedication of the national safety trophy won by the safety committee of the Mitchell, Ind., mill of the Lehigh Portland Cement Co., was observed May 28. The 900 employes at the plant went through 1926 without the loss of a single hour from accidents.

Among those taking part in the dedication were: W. H. Cameron of Chicago, managing director of the National Safety Council; A. J. R. Curtis, Portland Cement Association; Major H. A. Reninger, vice-president of the National Safety Council. Officials from most of the cement mills in the Middle West were present to do honor to the men.

The trophy was erected on the campus at the plant. It is a block of precast concrete, 8 ft. high, weighing 16,000 lb. Its face is embellished with a classic design and the motto, "Safety Follows Wisdom." A carved inscription below gives the date and significance of the award.

Canadian Silica Sand

Editor, Rock Products:

IN the article entitled "Ask Canadian Import Duty on Silica Sand," published in the May 14 issue, it is unfortunate that it should happen to end with the statement "The Canadian product was not satisfactory for glass manufacture," without mentioning our reply to that statement, which reply consisted in presenting the advisory board on tariff with samples of our sand together with official analysis of same showing that the iron content ranged from .056 to .09 (this content is perfectly satisfactory for glass manufacture).

If this reply had been incorporated in the report it might have given your readers a more complete idea on the question.

We thank you for the publicity given to our move and wish to remain.

P. A. Masson,
Silico, Limited, Montreal.

Current Abstracts of Foreign Literature

Comparison of German 4900-Mesh Sieve With English No. 180. Dr. Haegermann, Karlhorst, Germany, has recently conducted comparative sieve tests given below.

In a report made by Dr. Strebel, Hemmoor, on comparative strength results obtainable by making the specimens in accordance with standard German and British procedure, the German Portland Cement Association laboratory was urged to consider the British standards for fineness and to conduct tests using the German 4900-mesh and the British No. 180 sieves.

According to British standards, the amount retained on the No. 180 sieve shall not be greater than 10%.

Testing the Sieves

The No. 180 sieve contains $180 \cdot 180 = 32400$ meshes per sq. in. or 5022 meshes per sq. cm. The standards for this sieve are as follows: The clear mesh opening shall measure 0.0038 in. or 0.097 mm. The number of wires per linear inch or per 25.44 mm. shall be 180; their diameter shall be 0.0018 in. or 0.046 mm. The number of wires per linear inch shall not be greater than 182, nor less than 178. The true clear opening shall be greater than 0.0050 in. or 0.127 mm. The thickness of wire shall not be less than 0.00171 in. or 0.0434 mm., nor greater than 0.00189 in. or 0.0480 mm.

The German 4900-mesh sieve shall have the following dimensions, in accordance with DIN 1171 (wire mesh for test sieves):

Clear mesh opening (l) .... 0.088 mm.
Wire diameter (d) .... 0.055 mm.

Clear opening per unit of area.

$$\frac{l^2}{(l+d)^2} \cdot 100 = 36\%$$

PERMISSIBLE VARIATION IN GERMAN 4900-MESH SIEVE

	Thickness of wire 0.04 to 0.5 mm.	Mesh distance 10000 to 3600-mesh sieves
Average variation	5%	5%
Maximum variation†	10%	....
Range of maximum variation	15 to 30%	

†The allowable variation with relation to maximum variation or within the range of maximum variations is 6%.

The variations below the above values are neglected in making the tests.

Testing of the sieves was accomplished by means of microprojection with a magnification of 703 diameters, microscope magnifying to 53 diameters, measurement and counting.

Results of Sieve Tests

The British sieve deviates from the standards with respect to thickness of wire and number of wire. Its clear mesh opening conforms to the standards. The clear mesh opening is of utmost importance in this connection, as the small thickness of wire is cancelled by a greater number of wires per linear inch.

BRITISH SIEVE No. 180

Clear opening	Actual value mm.	Specified value mm.
Average	0.097	0.097
Maximum discrepancy	0.109	0.127
Average thickness of wire	0.042	0.046
Minimum value	0.0377	0.0434
Maximum value	0.0453	0.0480
Number of wires per lineal inch or per 25.44 mm.	184	178-182

GERMAN SIEVE (4900-MESH)

	Actual value	Specified value[2]
Clear mesh opening average	0.088 mm.	0.088 mm.
Maximum discrepancy in mm.		0.098 mm.
Maximum discrepancy in %		11.14%
Allowable range of maximum discrepancy		15 to 30%

[2]Allowable discrepancy 5% or 0.0044 mm.

As the maximum discrepancy is below the range of maximum allowable discrepancies, it is neglected. Had it come within this range, the sieve would still correspond to standard, providing that the number of maximum discrepancies was less than 6%.

Thickness of wire
Actual .... 0.0504 mm.
Specified .... 0.055 mm.
Average 5% variation allowable .... 0.00275 mm.
Or minimum wire thickness is on the average .... 0.05225 mm.
Maximum discrepancy may be: 10% or .... 0.0055 mm.

The thickness of wire of the German sieve does not correspond to standards, but its clear opening conforms to the latter.

Both sieves are standard when the clear mesh opening is taken as determining factor.

Conclusions

Sieving by hand in accordance with identical procedure results in the following values (amounts retained on sieves):

British sieve No. 180	German 4900-mesh sieve	Difference
1.54	3.46	1.92
2.16	3.98	1.82
2.53	4.20	1.67
2.62	4.60	1.98
3.30	5.75	2.45
3.50	5.70	2.20
4.10	5.84	1.74
5.65	8.87	3.22
5.85	9.23	3.38
6.04	8.54	2.50
6.25	9.02	2.77
9.20	12.00	2.80
9.20	13.40	4.20
9.21	13.07	3.86
9.94	13.14	3.20
10.90	14.50	3.60
11.44	14.20	2.76
12.15	15.18	3.03
16.40	20.75	4.35

A conversion factor, applying to all sieving operations, cannot be established on the basis of these test results. The important point made in British specifications with reference to 6 to 10% retained on the British sieve results in amounts retained on the German sieve at least 2.5% higher, i.e., an amount retained on the British sieve of 10% corresponds to 12.5% retained on the German sieve.—*Zement* (1927) **15**, 289-90.

Heat Economy in the Sand-Lime Brick Industry. A. Behnisch describes changes made at the Falkenberg sand-lime brick plant, Germany, through which effective heat economies were brought about. The operation, using the drum process with 2 Bernhardi presses, had a total capacity of about 40,000 brick a day. The plant also had four curing tunnels, each 27 ft. length, and one curing tunnel 47 ft. long, the total capacity being 31,000 brick. A survey showed the necessity of manufacturing more than this daily output. As the installation had but one Cornwall boiler of 646 sq. ft. heating surface at its disposal, the utilization of heat had to be made as extensive as possible to obviate the necessity of enlarging the steam generating plant.

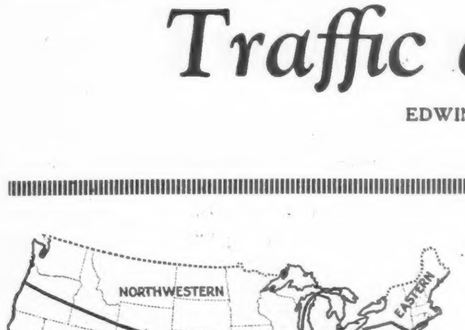
The loaded brick trucks are shoved into the tunnels, as commonly practiced. However, as after 6 hours the tunnels are filled, two preheating chambers were built onto the tunnels, in which the excess production of brick is preheated in concrete chambers, excluding undesirable air exposure.

When the brick have hardened sufficiently and are removed from the tunnel, the steam is forced into another tunnel. Such steam as may remain after this is directed into a preheater where water is heated. This preheated water is led to a high pressure storage tank. The boiler feed water entering the boiler from this high pressure storage tank has a temperature of about 100 to 120 deg. C. The steam, upon performing the work of preheating the water, is forced through a coil, located in a water tank, and is finally discharged into the preheating chamber mentioned above, where its heat is utilized for the preheating of stored units. The cold water required for boiler feed is pumped into the tank just mentioned, where it is preheated by the steam coil, after which it is forced into the preheater and enters the cycle. This utilization of heat has made it possible to produce 60,000 brick a day with a boiler of 646 sq. ft., which is an indication of heating at maximum capacity. *Tonindustrie-Zeitung* (1927), **33**, 570-1.

Aluminous Cement. Coarse raw materials for aluminous cement manufacture are shaped into briquets, preheated for 24 hr. and then kept for 30 hr. at a temperature between 1150 deg. and the melting point of the mixed material. The clinker produced is cooled for 30 hr. before grinding. *British Patent No.* 265,494.

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.



Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts), as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Apr. 30	May 7	Apr. 30	May 7
Eastern	3,440	3,638	10,226	12,168
Allegheny	3,656	3,974	8,379	9,497
Pocahontas	655	737	1,109	1,011
Southern	548	551	12,492	12,971
Northwestern	1,785	1,740	7,575	8,103
Central Western	632	674	9,868	11,414
Southwestern	324	361	4,737	6,833
Total	11,040	11,675	54,386	61,997

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1926 AND 1927

	Limestone Flux		Sand, Gravel and Stone	
	1926	1927	1926	1927
	Period to Date		Period to Date	
District	May 8	May 7	May 8	May 7
Eastern	50,138	59,191	65,665	76,750
Allegheny	63,575	62,612	66,948	83,249
Pocahontas	5,903	5,694	10,648	10,030
Southern	12,231	9,404	181,834	194,324
Northwestern	18,235	20,745	52,250	68,046
Central Western	8,336	8,468	121,794	120,969
Southwestern	3,798	5,473	74,301	81,382
Total	162,216	171,587	573,440	634,750

Comparative Total Loadings 1926 and 1927

	1926	***1927***
Limestone flux	***162,216***	***171,587***
Sand, stone and gravel	***573,440***	***634,750***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning June 5:

CENTRAL FREIGHT ASSOCIATION DOCKET

15717. To establish on **crushed stone**, carloads, Findlay, Ohio, to Pomeroy, Ohio, rate of 120c per net ton. Present rate, 20½c.

15720. To establish on **crushed stone**, carloads, East Liberty, Ohio, to Somerset, Ohio, rate of 100c per net ton. Present rate, 17c.

15725. To establish on **stone, crushed**, and stone screenings in bulk in open cars, carloads, Kenneth, Ind., to Camden, Ind., rate of 60c and to Flora and Bringhurst, Ind., rate of 65c per net ton. Present rate, 70c per net ton.

15728. To establish following rates on **crushed stone**, carloads, White Sulphur, Ohio, to stations in Ohio on the B. & O. R. R.:

To—	*Pres.	Pro.	To—	*Pres.	Pro.
Whitfield	120	100	Stockton	....	100
Miamisburg	120	100	Glendale	....	100
Carlisle	120	100	C. & D. Branch—		
Poast Town	120	100	Fair Ground	....	100
West Middletown	120	100	Woodsdale	....	100
Trenton	120	100	Rockdale	....	100
Busenbark	120	100	LeSourdsville	....	100
Overpeck	120	100	South Excello	....	100
Hamilton	120	100	Middletown	....	100

*Representing College Corner, Ohio, rate under intermediate application. Rates in cents per net ton.

15755. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Peru, Ind., to LaFontaine and Treaty, Ind., rate of 90c per net ton, and to Speichers and Urbana, Ind., rate of 81c per net ton. Route, via Wabash, Ind., and C. C. C. & St. L. Ry. Present rates, 10½c to LaFontaine and Treaty and 10c to Speichers and Urbana, Ind.

15766. To establish on **sand** except blast, engine, foundry, glass, loam, marl, molding and silica **and gravel**, carloads, Wolcottville, Ind., to Columbia City, Ind., rate of 70c per net ton. Present rate, 80c per net ton.

15780. To establish on **crushed stone**, crushed stone screenings, tailings and agricultural limestone, unburned, in bulk, carloads, Bedford, Coxton, Heltonville and Oolitic, Ind., to stations on the Penna. R. R. rates as follows:

Rates in cents per net ton

To—	Present	Proposed
Crothersville, Ind.	107	100
Austin, Ind.	107	100
Scottsburg, Ind.	112	100
Vienna, Ind.	112	100
Underwood, Ind.	112	100
Henryville, Ind.	112	105
Memphis, Ind.	113	105
Speeds, Ind.	113	110
Sellersburg, Ind.	113	110
Jeffersonville, Ind.	113	110
New Albany, Ind.	113	110

15785. To publish rate of 95c per net ton on **sand and gravel**, carloads, Massillon and Navarre, Ohio, to Zanesville, Ohio. Present rate, 110c per net ton.

SOUTHERN FREIGHT ASSOCIATION DOCKET

34169. **Crushed stone** from Mimms and Newsom, Tenn., to Erin, Tenn. It is proposed to establish the following reduced rates on crushed stone, carloads, usual description—to Erin, Tenn.: From Mimms, Tenn., 142c; from Newsom, Tenn., 137c per net ton, based 14c from Mimms and 9c per net ton from Newsom, Tenn., higher than existing rates from Franklin, Tenn.

34248. Granite, marble or **stone**, broken or **crushed**, from Hewitts, N. C., to destinations in So. Ry. Stone Tariff, I. C. C. A.-9979. Class or combination rates now apply. Proposed rates on—Granite, marble or stone, broken or crushed, carloads, minimum weight marked capacity of car, except when car is loaded to full visible capacity, actual weight will govern—from Hewitts, N. C., to destinations referred to, same as concurrently applicable from Regal, N. C.

34288. **Sand and gravel**, from Lilesville, N. C., to Myrtle Beach, S. C. Combination now applies. Proposed rate on sand and gravel, carloads, as per Description 9, S. A. L. Ry. I. C. C. A-7221, from Lilesville, N. C., to Myrtle Beach, S. C., 153c per net ton, based on carriers' proposed Georgia scale, less 10%.

34338. **Stone, crushed** or broken, from Russellville, Ky., to Glasgow, Ky., Kenwood, Ringgold, Tenn., Edgoten and Thompsonville, Ky. It is proposed to establish the following reduced rates on—Stone, crushed or broken, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Russellville, Ky., to Glasgow, Ky., 140c; to the other destinations named, 129c per net ton.

TRUNK LINE ASSOCIATION DOCKET

15320. **Sand and/or gravel**, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Carpentersville, N. J., to Raven Rock, Stockton, Lambertville, N. J., 75c; Ringoes, N. J., 81c, and Flemington, N. J., 86c per 100 lb. (subject to Rule 77). Reason—To establish rates which will be in proper alignment with those in force from Morrisville and Tullytown, Penn., as per P. R. R. Tariffs G. O. I. C. C. Nos. 14342 and 13940.

15340. **Sand and gravel**, carloads, from South Lakewood and Farmingdale, N. J., to Belle Mead, N. J., $1.27 per 2000 lb. Reason—Proposed rate compares favorably with rate from Raritan River R. R. stations to Trenton, N. J., as per R. R. R. R. Trf. I. C. C. 2267.

15343. To revise rates on **stone, crushed**, and screenings, carload, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Reading Junction and Mostoller, Penn., to the following points:

From Reading Junction, Penn.
(Rates in cents per ton of 2000 lb.)

Destination—	Proposed rate
Boswell, Penn.	80
Confluence, Penn.	100
Cumberland, Md.	125
Meyersdale, Penn.	100
Stoyestown, Penn.	60
Ursina, Penn.	100
West Salisbury, Penn.	105

SOUTHWESTERN FREIGHT BUREAU DOCKET

12353. **Sand and gravel**, from Muskogee, Okla., to points in Arkansas. To establish the following rates in cents per 100 lb. on sand and gravel, carloads, minimum weight marked capacity of car but not less than 80,000 lb., from Muskogee, Okla., to points shown below:

Summers, Ark.	5	Condit, Ark.	7
Lincoln, Ark.	5½	Hiawasse, Ark.	7
Suttle, Ark.	5½	Gale, Ark.	7
Prairie Grove, Ark.	5½	Gravette, Ark.	7
Appleby, Ark.	5½	Buck, Ark.	7
Starks, Ark.	5½	Beaty, Ark.	7
Farmington, Ark.	5½	Southwest City, Mo.	7
McNair, Ark	5½	Dodge, Okla.	7
Fayetteville, Ark.	5½	Grove, Okla.	7
E. Fayetteville, Ark.	5½	Fayette Junc., Ark.	5½
Barbara, Ark.	5½	Waterworks, Ark.	5½
Gulley, Ark.	5½	Leith, Ark.	5½
Johnsons, Ark.	5½	Harris, Ark.	6½
Springdale, Ark.	6½	Elkins, Ark.	6½
Vogel, Ark.	6½	Durham, Ark.	6½
Lowell, Ark.	6½	Thompson, Ark.	6½
Rogers, Ark.	6½	Crosses, Ark.	6½
Aboca, Ark.	6½	Delaney, Ark.	6½
Garfield, Ark.	7	Patrick, Ark.	6½
Osborne, Ark.	7	Combs, Ark.	6
Irelan, Ark.	6½	Brashears, Ark.	7
Apple, Ark.	6½	St. Paul, Ark.	7
Bentonville, Ark.	7	Dutton, Ark.	7
Centerton, Ark.	7	Pettigrew, Ark.	7

The present rates, it is stated, are prohibitive and will not permit the shippers at Muskogee, Okla., to compete with shippers at Kriener, Ft. Gibson and Verkney, Okla.

ILLINOIS FREIGHT ASSOCIATION DOCKET

1356A. **Sand and gravel**, carloads, from Chillicothe, Ill., to Princeton, Ill. (rates in cents per ton of 2000 lb.): Present, 101; proposed, 88.

1480. **Sand** (molding), carloads, minimum weight 90% of marked capacity of car, except that when car is loaded to full visible capacity actual weight will apply, from Dallas City, Ill., to Madison, Wis. (Rates per net ton): Present, $2.99; proposed, $2.25.

1526. **Stone, crushed**, ground or broken, carloads, from Valmeyer, Ill., to Marco, Mt. Vernon, Ryder, Scheller and Waltonville, Ill. (Rates in cents per ton of 2000 lb.): Present, 94; proposed, 90.

1526. **Stone, crushed**, carloads, from Anna, Ill., to Pierron to Farrington, Ill., inc. (Rates per ton of 2000 lb.) To representative points.

	Pres.	Prop.
Pierron, Ill.	**	$1.17
Farrington, Ill.	**	1.30
Woodbury, Ill.	**	1.26

**Class rates.

3822. To establish the following mileage scale of rates on **sand** (other than glass, silica or molding) and **gravel**, carloads, minimum weight 90% of marked capacity of car, except when loaded to full visible capacity, in which case actual weight will apply, but not less than 90,000 lb., from Ottawa, Ill., via the C. B. & Q. and C. R. I. & P. as originating lines to destinations on the C. & A., C. C. C. & St. L. Ry., I. C. R. R., N. Y. C. R. R. and Wabash Ry.

	Cents per ton
25 miles and under	90
50 miles and over 25	100
75 miles and over 50	110
100 miles and over 75	120
125 miles and over 100	130
150 miles and over 125	140
175 miles and over 150	150
200 miles and over 175	160

4052. **Sand and gravel**, carloads, from Brookport and Metropolis, Ill., to Carrier Mills, Ill. Rates in cents per ton of 2000 lb. Present, 101; proposed, 88.

4082. Chatts; cinders; **gravel**; **sand**; stone, broken; **stone, crushed**; **limestone, agricultural**, ground or pulverized, etc., from C. M. & St. P. Ry. stations in Iowa as shown in Item 6252-D, C. M. & St. P. G. F. D. 999-H to C. M. & St. P. Ry. stations in Wisconsin in I. R. C. territory.

Rates in cents per 100 lb.

Distance	Present	Proposed
10 miles	3.5	3
20 miles	4	3
30 miles	5	3
40 miles	5.5	3.5
50 miles	6.5	3.5
70 miles	7	4.5
80 miles	8	4.5
90 miles	8.5	5
100 miles	9	5
120 miles	10	5
140 miles	10.5	6
160 miles	11	6
180 miles	11.5	6
200 miles	12	6.5
230 miles	13.5	6.5
260 miles	14	7
300 miles	15.5	7

4090. **Stone, crushed**, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full visible capacity actual weight will apply, but not less than 40,000 lb., from Hannibal, Mo., to Decatur, Niantic, Buffalo, Riverton, etc., Ill. Present, $2.50 per net ton; proposed, 88c per net ton.

TRUNK LINE ASSOCIATION DOCKET

15185. **Sand**, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity actual weight will apply, from Carpentersville, N. J., to Pequest and Great Meadows, N. J., $1.05 per ton of 2000 lb.

15376. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply. (B)—Sand, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply.

To	*(A)	†(B)
South Amboy, N. J	......	92
Morgan, N. J	......	92
Clifford, N. J	......	92
Matawan, N. J	......	104
Hazlet, N. J	85	104
Middletown, N. J	90	104
Red Bank, N. J	90	115
Little Silver, N. J	90	115
Branchport, N. J	105	115
Long Branch, N. J	105	115
West End, N. J	105	104
Elberon, N. J	105	104
Deal Beach, N. J	105	104
Allenhurst, N. J	105	104
North Ashbury Park, N. J	105	105
Ashbury Park-Ocean Grove, N. J	105	104
Bradley Beach, N. J	105	104
Avon, N. J	105	104
Belmar, N. J	90	104
Como, N. J	90	104
Spring Lake, N. J	90	104
Sea Girt, N. J	90	92
Manasquan, N. J	90	92
Brielle, N. J	90	92
Point Pleasant, N. J	90	92

*From Morrisville and Tullytown, Penn., proposed rate. †Masonville and South Pemberton, N. J., proposed rate.

And it is also desired to take care of the following intermediate territory:

To	(C)	(D)
Jamesburg Stas., N. J	92	....
Manasquan, N. J	92	....
Sea Girt, N. J	92	90
Sea Side Park, N. J. to Sea Side Hts., N. J.	92	....
Bay Head, N. J	92	....

(C) From Masonville and South Pemberton, N. J. (D) From Morrisville and Tulleytown, Penn.

Reason—Proposed rates compare favorably with rates now published locally by the P. R. R., from the shipping points involved to destinations in the same general territory, as per P. R. R. Tariff G. O., I. C. C. No. 14342.

15360. **Gravel and sand**, other than blast, engine, foundry, glass, molding or silica, minimum weight 90% of marked capacity of car, from Attica, N. Y., to Adams Basin, N. Y., 91c per ton of 2000 lb. Reason—Proposed rate compares favorably with rates on like commodities from and to points in the same general territory, as per N. Y. C. R. R. Tariff I. C. C. N. Y. C. No. 15406.

15368. **Gravel or sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Patapsco, Md., to Brandywine, Md., 90c per 2000 lb. (subject to Rule 77). Reason—To establish rate which will be comparable with those in force from and to points in the same general territory, as per P. R. R. Tariff G. O. I. C. C. No. 14343.

15381. **Gravel and sand**, N. O. I. B. N., in O. C., other than blast, engine, foundry, glass, molding, quartz, silex and silica, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Kenvil and Succasunna, N. J., to Martins Creek, Penn., 90c per net ton of 2000 lb., to apply as maxima from and to intermediate points. Reason—Proposed rate is the Birdsboro scale for a one-line haul, and is the same as now published from Carpenterville, N. J., to Martins Creek, Penn., as per P. R. R. Tariff G. O. I. C. C. 13744.

Crushed Rock Scale Proposed from Kansas City, Mo., to Kansas Points

EXAMINER C. W. GRIFFIN, in a proposed report on No. 18908, Clay County Crushed Rock Co. et al. vs. Atchison, Topeka & Santa Fe et al.; No. 19002, Thomson Brothers Rock Co. et al. vs. Same; and I. and S. No. 2778, crushed stone from Kansas City, Mo., to points in Kansas on the Chicago, Rock Island & Pacific, said the Commission should find unreasonable and unduly prejudicial the interstate rates on crushed stone, from McDowell, Mo., and on gravel, from Holliday, Kans., to destinations in the Kansas City, Mo.-Kans., switching district; make a like finding as to interstate rates on crushed stone, from Birmingham, McDowell, Pixleys and Hueyette, Mo., and Morris and Everett, Kans., to destinations in Kansas, and on like traffic from Morris, Everett and Hueyette, Mo., and gravel from Holliday, Kans., to destinations in Missouri.

A third finding, Griffin said, should be that undue prejudice to Morris, Everett, Holliday and Hueyette and the undue preference of Sugar Creek and Leeds, Mo., and unjust discrimination against interstate commerce resulted from the relation of interstate rates on crushed stone from Morris, Everett and Hueyette, and on gravel from Holliday to destinations in Missouri and the intrastate rates on crushed stone from Sugar Creek and Leeds, Mo., to the same points.

A copy of the complaint in No. 19002, the examiner said, was forwarded to the Missouri commission. He said it was also notified of the hearing but did not appear. Griffin said:

The Commission should find that the interstate rates maintained by defendants in No. 18908 on crushed stone, in carloads, from McDowell, Mo., and by defendants in No. 19002 on gravel, in carloads, from Holliday, Kans., to industrial and team track deliveries within the Kansas City, Mo.-Kans., switching district are and for the future will be unreasonable and unduly prejudicial to the extent they exceed or may exceed a rate of 50 cents per net ton.

The Commission should further find that the rates maintained by defendants in No. 18908 on crushed stone, in carloads, from Birmingham, McDowell, Pixleys and Hueyette, Mo., to points in Kansas, and on like traffic moving interstate from Morris and Everett to the same destinations, and by defendants in No. 19002 on crushed stone, in carloads, from Morris and Everett, and on gravel, in carloads, from Holliday to points in Missouri, also on crushed stone, in carloads, moving interstate from Hueyette to the same destinations, are and for the future will be unreasonable to the extent they exceed or may exceed rates based upon a mileage scale the same as that now in effect on crushed stone, in carloads, intrastate in Missouri shown in column 1 of Appendix C for single-line hauls, plus an arbitrary of 20 cents per ton for hauls over two or more lines, not parts of the same system and not under a common ownership or control, and unduly prejudicial to the extent they exceed or may exceed the rates contemporaneously in effect on crushed stone, in carloads, from Cement City (Sugar Creek) and Leeds, Mo., to the same destinations.

The Commission should further find in No. 19002 that the intrastate rates on crushed stone, in carloads, from Cement City (Sugar Creek) and Leeds to points in Missouri to the extent that they are, or for the future may be lower than the interstate rates contemporaneously maintained on like traffic from Morris and Everett, Kans., and Hueyette, Mo., and on gravel, in carloads, from Holliday, to said destinations, result and will result in undue prejudice to Morris, Everett, Holliday and Hueyette and shippers therefrom, in undue preference of Cement City (Sugar Creek) and Leeds and shippers therefrom, and in unjust discrimination against interstate commerce.

The Commission should further find that said undue prejudice, undue preference and unjust discrimination against interstate commerce can and should be removed by the establishment and maintenance of rates for the intrastate transportation of crushed stone, in carloads, from Cement City (Sugar Creek) and Leeds to said destinations, which shall not be lower than the interstate rates contemporaneously in effect on crushed stone, in carloads, from Morris, Everett and Hueyette and on gravel in carloads, from Holliday to the same destinations.

In Investigation and Suspension Docket No. 2778 the Commission should find that the proposed rates have not been justified. An order should be entered directing cancellation of the suspended schedules without prejudice to the filing of schedules naming rates not to exceed those based on the mileage scale prescribed herein.

The Missouri single-line scale recommended by the examiner and shown in the appendix in which he showed other scales either in use or proposed begins with a rate of 60 cents for distances up to 20 miles. It progresses five cents per ton for each ten miles up to 100 miles, at which distance the rate is 100 cents, then also five cents per ton for ten miles up to 130 cents for 160 miles. Then the addition per ton is four cents for ten-mile blocks to the end at 200 miles with a rate of 146 cents.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	....	1.60	1.30	1.30	1.30
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Danbury, Conn.	2.25	2.25	2.00	1.75	1.50	....
Dundas, Ont.	3.04	1.05	1.05	.90	.90	.90
Frederick, Md.	.50@ .75	1.20@1.30	1.15@1.25	1.10@1.15	1.10@1.15	1.05@1.10
Munns, N. Y.	1.00	1.50	1.50	1.40	1.25	
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	....
Prospect, N. Y.	1.00	1.50	1.40	1.30	1.30	....
Walford, Penn.	....	....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.			....	.75	.75	1.50
Alton, Ill.	1.85	....	1.85	....	....	....
Buffalo, Iowa	1.10	....	1.50	1.30	1.35	1.35
Chasco, Ill.	1.00@1.30	....	1.00@1.15	....	1.00@1.15	....
Columbia, Krause, Valmeyer, Ill.	1.10@1.50	1.10@1.25	1.20@1.35	1.10@1.35	1.10@1.35	‖1.25
Flux (Valmeyer)	1.10@1.50	....	....	1.75	....	1.75
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood, Iowa	.95e	....	1.50[1]	1.40[2]	1.30[3]	....
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
River Rouge, Mich.	1.20	1.20	1.20	1.20	1.20	1.20
Milltown, Ind.	....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Mt. Vernon, Ill.	1.10@1.20	1.00	1.00	1.00	1.00	....
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	....	....	1.20	1.10	1.00	....
St. Vincent de Paul, Que. (A)	.80	1.25	1.00	.95	.95	.95
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Ont.	1.55	2.05	2.05	1.90	1.90	1.90
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50	....	1.00	.90	.90	....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Alderson, W. Va.	.40	1.45	1.35	1.25	1.20	....
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Brooksville, Fla.	.75		2.65	2.65	2.40	2.00
Cartersville, Ga.	1.15	1.65	1.65	1.40	1.15	....
Chico, Tex.	1.00	1.35	1.25	1.20	1.10	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	....
Ft. Springs, W. Va.	.50	1.35	1.35	1.20	1.20	....
Graystone, Ala.	.50	Crusher run, screened, $1 per ton				
Kendrick and Santos, Fla.		3½ in. and less, $1 per ton				
Ladds, Ga.	....	1.65	1.65	1.35	1.15	1.15
New Braunfels, Tex.	.60	1.25	1.10	.90	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.¶	.50	1.90	1.90	1.90	1.90	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Kansas City, Mo.	1.00	1.60	1.60	1.60	1.60	1.60
Cape Girardeau, Mo.	.90	1.25	1.25	1.25	1.00	....
Rock Hill, St. Louis Co., Mo.	1.45	1.45	1.35	1.35	1.35	1.35

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90	2.25	1.75	1.55	1.35	1.25
Dwight, Calif.	1.00	1.00	1.00	.90	.90	....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.55	1.45	1.25	....
New Haven, New Britain, Meriden and Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.40	1.80	1.40	1.40	1.40	....
Oakland and El Cerito, Calif.	1.00	1.00	1.00	.90	.90	....
Richmond, Calif.	.75	....	1.00	1.00	1.00	....
San Diego, Calif.	.70	2.00	1.50	....	1.25	1.25
Springfield, N. J.	1.70	2.20	2.10	1.70	1.60	1.60
Toronto, Ont.	....	3.58@4.05	3.05@3.80	....	....	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	....
Columbia, S. C.—Granite	....	2.00	1.75	1.75	1.60	....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.		Crushed flint rock, 2.50 per cu. yd.				
Graystone, Ala.—Granite	.50	....	....	....	....	....
Lithonia, Ga.	.75a	2.00b	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.	3.00@3.50	....	2.00@2.25	2.00@2.25	....	1.25@3.00
Richmond, Calif.—Quartzite	.75	....	1.00	1.00	1.00	....
Rochester, N. Y.		Dolomite, all sizes, $1.50 per ton				
Somerset, Penn. (sand-rock)		1.50 to 1.85				
Toccoa, Ga.—Granite	.50	1.35	1.35	1.30	1.25	1.25

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.30. ¶Rip rap 1.60 per ton. (f) ¼ in. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (e) Agstone to June 15, 1927. [1] ¾ to ¼ in. [2] 1 to ¼ in. [3] 1½ to ¼ in. (A) Ballast .80.

Agricultural Limestone

(Pulverized)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.50
Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Brandon and Middlebury, Vt.—Pulverized, burlap bags, 6.00; paper, $5.00; bulk	4.00
Cape Girardeau, Mo.—50% thru 50-mesh	1.50
Cartersville, Ga.—50% thru 50-mesh	1.50
Charleston, W. Va.—Marl, per ton, bulk	3.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Tex.—50% thru 50 mesh, 1.75; 50% thru 100 mesh	2.25
Colton, Calif.—Analysis, 90% $CaCO_3$, bulk	4.00
Cypress, Ill.—90% thru 100 mesh	1.35
Ft. Springs, W. Va.—50% thru 4 mesh	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags	3.95
Bulk	2.70
(Paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.25; bulk	2.75
Joliet, Ill.—Analysis, $CaCO_3$, 55%; $MgCO_3$, 45%; 90% thru 100 mesh	3.50
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
80% thru 200 mesh, bags, 4.25; bulk	3.00
Ladds, Ga.—Analysis, $CaCO_3$, 64%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh	1.50@ 2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marlbrook, Va.—Marl, per ton, bulk	2.25
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Middlebury, Vt.—$CaCO_3$, 99.05%; 50% thru 200 mesh; sacked	5.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, $CaCO_3$, 95%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Syracuse, N. Y.—Analysis 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk	2.75
Toledo, Ohio—30% thru 50 mesh	2.25
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.50; paper, 4.00; bulk	3.25

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	3.00
Atlas, Ky.—90% thru 4 mesh	1.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh; 25% thru 100 mesh; 50% thru 50 mesh	1.50

(Continued on next page)

Agricultural Limestone

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh		1.75
50% thru 4 mesh		1.50
Chicago, Ill. — 50% thru 100 mesh; 90% thru 4 mesh		.80
Columbia, Krause, Valmeyer, Ill. — Analysis, 90% $CaCO_3$; 100% thru 4 mesh	1.10@	1.50
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh		1.35
Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk		3.25
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh		1.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh		1.50
Kansas City, Mo. — 50% thru 100 mesh		1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh		2.00
Screenings (¼ in. to dust)		1.00
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92¼ $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk		1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@	2.35
McCook, Ill.—90% thru 4 mesh		.90
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh		1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh		1.50
Mountville, Va. — Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh, bags		5.50
Pixley, Mo. — Analysis, 96% $CaCO_3$; 50% thru 50 mesh		1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh		1.65
River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@	1.40
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh		.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes		1.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh		2.30

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk		3.00
Joliet, Ill. — Analysis, 55% $CaCO_3$; 45% $MgCO_3$; 95% thru 100 mesh		3.50
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@	3.50
Rocky Point, Va.—82% thru 200 mesh, 2.50@3.50 bulk, paper bags	3.75@	4.75
Waukesha, Wis.—90% thru 100 mesh, bulk		4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Berkeley Springs, W. Va.	2.00@	2.25
Buffalo, N. Y.	2.00@	2.50
Cedarville and S. Vineland, N. J.—Damp		1.75
Dry		2.25
Elco, Ill.	*18.00@	*31.00
Estill Springs and Sewanee, Tenn.		1.50
Franklin, Penn.		2.25
Gray Summit and Klondike, Mo.	1.75@	2.00
Los Angeles, Calif.—Washed		5.00
Mapleton Depot, Penn.	2.00@	2.25
Massillon, Ohio		3.00
Mendota, Va.	2.25@	2.50
Michigan City, Ind.		.35
Mineral Ridge and Ohlton, Ohio		2.50
Oceanside, Calif.		3.00
Ohlton, Ohio		2.50
Pittsburgh, Penn.	3.00@	4.00
Ridgway, Penn.		2.50
Rockwood, Mich.	2.75@	3.25
Round Top, Md.		2.00
San Francisco, Calif.	4.00@	5.00
Silica, Va.		2.50
St. Louis, Mo.		2.00
Sewanee, Tenn.		1.50
Thayers, Penn.		2.50
Zanesville, Ohio		2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Columbus, Ohio		.15@ .30
Dresden, Ohio		1.00@ 1.25
Eau Claire, Wis.	4.25	1.00
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50

*Ground silica, carload.

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.65	.65	.65	.65	.65	.65
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	.95	.85			
Erie, Penn.		1.00*		1.50*	1.75*	
Farmingdale, N. J.	.58	.48	.85	1.25	1.15	
Leeds Junction, Me.		.50	1.75		1.25	1.00c
Machias Jct., N. Y.	.75	.75	.85	.75	.75	.75
Montoursville, Penn.	1.00	1.00	.90	.80	.80	.80
Portland, Me.		1.00	2.25		2.00	
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Penn.		2.00				
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	1.70	1.50	1.50	1.30
York, Penn.	1.10	1.00				
CENTRAL:						
Aurora, Ill.		.40@ .50	.40	.50	.70	.70
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.		.45	1.25	1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Barton, Wis.		.50	.75	.75	.75	.75
Chicago district, Ill.	.70	.55	.55	.60	.60	.60
Columbus, Ohio¶		.75	.75	.75	.75	
Des Moines, Iowa	.40	.40	1.40	1.40	1.40	1.40
Eau Claire and Chippewa Falls, Wis.	.40	.40	.65@ .75	.90	.90	
Elkhart Lake, Wis.	.45	.30	.40	.50	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.		.50		.80	.80	.70
Hamilton, Ohio		1.50*	1.50*	1.50*	1.50*	
Hersey, Mich.		.50				.70
Humboldt, Iowa	.50	.50	1.50	1.50	1.50	1.50
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Joliet, Plainfield and Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Iowa	.50@ .60	.50@ .60	1.30	1.30	1.20	1.20
Mankato, Minn.				1.25	1.25	1.25
Mattoon, Ill.	.75@ .85	.60@ .85	.85	.85	.85	.85
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.40@ .50	.40@ .50	1.40	1.35	1.25	
Pittsburgh, Penn.	1.25	1.25	.85	.85	.85	.85
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.20	1.45	1.55a	1.45	1.45	1.45
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.25	1.25
Zanesville, Ohio		.60	.50	.60	.80	
SOUTHERN:						
Charleston, W. Va.	1.40	1.40	1.40	1.40	1.40	1.40
Brewster, Fla.	.45	.45	2.25			
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Chattahoochee River, Fla.		.70		1.75		
Eustis, Fla.		.50@ .60				
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Knoxville, Tenn.	1.00	1.00		1.20	1.20	1.00
Macon, Ga.	.50	.50			.95	
New Martinsville, W. Va.	1.00	.90@1.00		1.20@1.30		.80@ .90
Roseland, La.	.35	.35	1.25	1.00	.65	.65
WESTERN:						
Kansas City, Mo.		.70				
Los Angeles, Calif.	.40	.40	.25@1.00	.25@1.00	.25@1.00	.25@1.00
Oregon City, Ore.		1.50*	1.50*	1.50*	1.50*	1.50*
Phoenix, Ariz.	1.25	1.10	2.50	2.00	1.25	1.10
Pueblo, Colo.	.80	.60		1.20		1.15
San Diego, Calif.		.75	1.40	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.25	1.25	1.25	1.25	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.						.60
Burnside, Conn.	.75					
Chicago district, Ill.	.35					
Ferrysburg, Mich.						.65@1.00
East Hartford, Conn.	.75*					
Gainesville, Texas		1.00			.55	
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Lindsay, Texas		1.10				.55
Macon, Ga.	.35					
Mankato, Minn.	.30					
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Ottawa, Oregon, Moronts and Yorkville, Ill.			Ave. .60 per ton all sizes			
Somerset, Penn.		1.85@2.00		1.50@1.75		
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less. (d) Less 10c per ton if paid E.O.M. 10 days. (g) ¾-in. and less. ¶By truck only.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.25	2.00	2.25	1.50		4.00g	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75	1.75		1.75	1.75@2.00		
Buffalo, N. Y.	1.50	1.50		2.00@2.50			
Columbus, Ohio	1.50@2.00	1.25@1.50	2.00	.30	1.75@2.00	2.75@4.50	
Dresden, Ohio	1.50@1.75	1.25@1.50	1.50@1.75	1.00@1.25			
Eau Claire & Chippewa Falls, Wis.						3.00	
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Klondike, Mo.	1.75@2.00		1.75@2.00	1.75@2.00	1.75@2.00		1.75
Mapleton Depot, Pa.	2.00	2.00		2.00	2.00	2.00	
Massillon, Ohio	2.25	2.25		2.25	2.50		
Mendota, Va.	Ground flint or silex—16.00@20.00 per ton						
Michigan City, Ind.				.30	.30		
Millville, N. J.				1.75b		3.50	
Montoursville, Pa.				1.35@1.50			
New Lexington, O.	2.00	1.25					
Ohlton, Ohio	2.00*	2.00*		1.65*	1.50*	2.50*	1.75*
Ridgway, Penn.	1.50	1.50	1.75@2.00c				
Round Top, Md.				1.60		2.25	
San Fr'ncisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Va.	Potters' flint per ton, 9.00@10.00						
Thayers, Penn.	1.25	1.25		2.00			
Utica, Ill.	.55	.60		.75	.75		
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	1.50*@2.00	1.50*@2.00	1.50*@2.00	1.50*@2.00	1.50*@2.00		
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.50		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (b) Damp. (c) Shipped from Albany. (g) Dry.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium, Erie and Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio		1.30*	1.80*	1.45*		1.45*	
Jackson, Ohio		1.05*		1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.50*		1.50*	1.50*	1.50*	
Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.15[5]
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95[4]
Chazy, N. Y.		8.50	7.50	10.00		15.50[28]	8.50	14.00
Lime Ridge, Penn.							5.00[2]	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00[12]
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50	8.50	10.50	8.50	1.65[7]
CENTRAL:								
Afton, Mich.							8.40	1.39
Carey, Ohio	12.50	8.50	8.50		9.00		8.00	1.50
Cold Springs, Ohio		8.50	8.50				8.00	
Cold Springs and Gibsonburg, Ohio	12.50	8.50	8.50		9.00	11.00		
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio	12.50							
Milltown, Ind.		8.50@10.00		10.00[8]			8.50[22]	1.35[10]
Scioto, Ohio	12.50[29]	8.50	8.50	10.00	.62½	7.50	1.50[3]	1.70[4]
Sheboygan, Wis.	11.50				9.50		9.50	
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio	12.50	8.50	8.50	13.50	9.00	11.00	9.00	1.50[3]
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Texas							7.00	
Graystone & Landmark, Ala.	12.50	9.00	9.00	9.00@10.00			8@10	1.35
Keystone, Ala.	12.50	9.00	9.00	9.00@10.00			8.00	1.35
Knoxville, Tenn.	20.25	9.00	9.00	9.00	8.00		8.00	1.35
New Braunfels, Tex.	18.00	12.00	10.00	12.00	10.00		9.50	
Ocala, Fla.		11.00	9.00				11.00	1.50
Saginaw, Ala.	12.50	10.00	9.00	10.00			8.50	1.50
WESTERN:								
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Los Angeles, Calif.	19.00	19.00	14.00		16.20		12.50	2.50
Dittlinger, Tex.		12.00@13.00					9.50[8]	1.50[23]
San Francisco, Calif.	21.00	19.00	16.50				14.00	2.00
Tehachapi, Calif.					11.80			
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[2] Net ton. [3] Wooden, steel 1.70. [4] Steel. [5] Per 180-lb. barrel. [6] Dealers' prices, net 30 days less 25c disc. per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65. [8] To 11.00. [10] To 1.50. [12] To 3.00. [22] To 9.00. [23] To 1.60. [28] Barrels. [29] F. o. b. Woodville.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Mapleton Depot, Penn.	1.90	2.00
Massillon, Ohio		2.00
Michigan City, Ind. (Engine sand)		.20@ .30
Mineral Ridge, Ohio	*1.75	*1.75
Montoursville, Penn.		1.10
Ohlton, Ohio	a1.75	a1.60
Red Wing, Minn.		1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50	3.50
Thayers, Penn.		2.25
Warwick, Ohio	2.00	2.00
Zanesville, Ohio		2.50

*Wet. †Fine; coarse dry, 3.00@3.50. (a) Green.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:
- Crude talc (mine run) ... 3.00@ 4.00
- Ground talc (20-50 mesh), bags ... 10.00
- Cubes ... 55.00
- Blanks (per lb.) ... .08
- Pencils and steel worker's crayons ... .08
- Per gross ... 1.00@ 1.50

Chatsworth, Ga:
- Crude talc, grinding ... 5.00
- Ground talc (150-200 mesh), bags ... 10.00
- Pencils and steel worker's crayons, per gross ... 1.00@ 2.50

Chester, Vt.:
- Ground talc (150-200 mesh), bulk ... 8.00@ 9.00
- Including bags ... 9.00@10.00

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags ... 30.00

Dalton, Ga.:
- Crude talc (for grinding) ... 5.00
- Ground talc (150-200), bags ... 10.00
- Pencils and steel worker's crayons, per gross ... 1.00@ 1.50

Emeryville, N. Y.:
- (Double air floated) including bags; 325 mesh ... 14.75
- 200 mesh ... 13.75

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) including bags, 300-350 mesh ... 15.50@20.00

Henry, Va.:
- Crude (mine run) ... 3.50@ 4.50
- Ground talc (150-200 mesh), bulk ... 8.50@14.00

Joliet, Ill.:
- Roofing talc, bags ... 12.00
- Ground talc (200 mesh), bags ... 32.00

Keeler, Calif.:
- Ground (200-300 mesh), bags ... 20.00@30.00

Natural Bridge, N. Y.:
- Ground talc (125-200 mesh), bags ... 10.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Columbia, Tenn.—B.P.L. 65-70%	3.50@ 4.50
Gordonsburg, Tenn.—B.P.L. 65-72%	3.75@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72%	5.50
Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lb.)

Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72½%	9.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—Per ton, Mine run	360.00
Clean shop scrap	25.00
Mine scrap	22.00
Roofing mica	30.00
Punch mica, per lb.	.12

Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	....	10.50
Brandon, Vt. — English pink, English cream and coral pink	*11.00	*11.00
Brandon grey	*11.00	*11.00
Brighton, Tenn.—Pink..	6.00	5.00
Mixed pink and bronze	4.50@ 6.00	4.50@ 6.00
All colors, mixed sizes	3.50	3.50
Buckingham, Que.—Buff stucco dash	....	12.00@14.00
Chicago, Ill. — Stucco chips, in sacks, f.o.b. quarries	....	17.50
Crown Point, N. Y.—Mica spar	....	9.00@10.00
Dayton, Ohio	....	6.00@24.00
Easton, Penn.—		
Green stucco	....	12.00@18.00
Green granite	....	14.00@20.00
Haddam, Conn.—Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash	....	6.00@24.00
Middlebrook, Mo.—Red..	....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	....	5.50
Milwaukee, Wis.	....	14.00@34.00
Newark, N. J.—Roofing granules	....	7.50
New York, N. Y.—Red and yellow Verona	....	32.00
Red Granite, Wis.	....	7.50
Stockton, Calif.—"Natrock" roofing grits	....	12.00@18.00
Tuckahoe, N. Y.—Tuckahoe white	12.00	....
Wauwatosa, Wis.	....	20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

*Carloads, including bags; L.C.L. 14.50.
†C.L. L.C.L. 17.00.
‡Carloads, including bags; L.C.L. 10.00.

Potash Feldspar

Auburn and Topsham, Me. — Color white; 98% thru 140-mesh bags, 22.00; bulk	19.00
Bristol, Tenn.—Color, white; analysis, K_2O, 6 to 10%; Na_2O, 2½ to 4%; SiO_2, 68 to 78%; Fe_2O_3, 12 to 20%; Al_2O_3, 16.5 to 18.5%; 99% thru 200 mesh; bulk, depending on grade	14.50@18.00
Buckingham, Que.—Color, white, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white, bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% thru 60 mesh, bags	16.00
96% thru 150 mesh, bags	28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton..	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude (bulk)	7.00
Keystone, S. D.—Prime white; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 10.20%; crude	10.05
Pulverized, 95% thru 200 mesh; bags, 22.00; bulk	20.00
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—Color, white; crude, bulk	8.00
Ground, bulk	16.50
Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
99% thru 140 mesh, bulk	16.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude..	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast and Rockland, Me.—(Limestone), bags, per ton	‡10.00
Brandon and Middlebury, Vt.—Per ton	10.00
Cartersville, Ga.—(Limestone), per bag	2.00
Centerville, Iowa—(Gypsum), per ton..	18.00
Chico, Texas — (Limestone), 100-lb. bags, per ton	8.00@ 9.00
Danbury, Conn.—(Limestone), bulk....	6.00@ 7.00
Easton, Penn.—Per ton, bulk	3.00
Joliet, Ill.—(Limestone), bags, per ton	4.50
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton	15.00
Gypsum, Ohio—(Gypsum), per ton....	10.00
Limestone, Wash. — (Limestone), per ton	12.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	10.00
Warren, N. H.—(Mica), per ton	3.85@ 3.90
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.—(Limestone), bulk	‡7.50@*9.00
Wisconsin Points—(Limestone), per ton	9.00

*L.C.L. †Less than 5-ton lots. ‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	10.00@11.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50@13.00b
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	17.50*
Farmington, Conn.	13.00
Flint, Mich.	¶12.00@17.50*
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.50@15.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis and St. Paul, Minn.	10.00
Minnesota Transfer	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	13.50@14.50
Portage, Wis.	15.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75*
Saginaw, Mich	13.50
San Antonio, Texas	16.00
Sebewaing, Mich.	12.00
Sioux Falls, S. Dak.	13.00c
South River, N. J.	14.00
Syracuse, N. Y.	18.00@20.00*
Toronto, Canada	11.00@13.50*
Wilkinson, Fla.	10.00@12.00
Winnipeg, Canada	14.00

*Delivered on job. ¶Dealers' price. (b) Delivered to Milwaukee. (c) Delivered at yard.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.86¾	3.47
Atlanta, Ga.	....	2.35
Baltimore, Md.	....	2.25
Birmingham, Ala.	....	2.30
Boston, Mass.	.52¾	2.13@2.23
Buffalo, N. Y.	.55	2.20@2.30
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	....	2.24
Charleston, S. C.	....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	.58	2.32
Cleveland, Ohio	....	2.24
Chicago, Ill.	.51¼	2.05
Columbus, Ohio	.57¼	2.29
Concrete, Wash.	....	2.35
Dallas, Texas	....	2.00
Davenport, Iowa	....	2.24
Dayton, Ohio	.58¼	2.33
Denver, Colo.	.66¼	2.65
Des Moines, Iowa	....	2.05
Detroit, Mich.	....	2.15
Duluth, Minn.	....	2.04
Houston, Texas	....	2.00
Indianapolis, Ind.	.54¾	2.19
Jackson, Miss.	....	2.50
Jacksonville, Fla.	....	2.20
Jersey City, N. J.	....	2.13
Kansas City, Mo.	....	1.92
Los Angeles, Calif.	....	2.30
Louisville, Ky.	.55½	2.22
Memphis, Tenn.	....	2.50
Milwaukee, Wis.	....	2.20
Minneapolis, Minn.	....	2.12
Montreal, Que.	....	1.36
New Orleans, La.	....	2.20
New York, N. Y.	.48¼	1.93@2.03
Norfolk, Va.	....	2.07
Oklahoma City, Okla.	....	2.46
Omaha, Neb.	....	2.36
Peoria, Ill.	....	2.22
Philadelphia, Penn.	....	2.11@2.21
Phoenix, Ariz.	.81½	3.26
Pittsburgh, Penn.	....	2.04
Portland, Colo.	....	2.80
Portland, Ore.	....	2.60
Reno, Nev.	....	2.91
Richmond, Va.	....	2.34
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	....	2.21
Savannah, Ga.	....	2.50
St. Louis, Mo.	.51¼	2.05
St. Paul, Minn.	....	2.12
Seattle, Wash.	....	2.65
Tampa, Fla.	....	2.25
Toledo, Ohio	....	2.20
Topeka, Kan.	....	2.41
Tulsa, Okla.	....	2.33
Wheeling, W. Va.	....	2.12
Winston-Salem, N. C.	....	2.62

NOTE—Add 40c per bbl. for bags.
(a) Price includes sacks.
Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	....	2.15
Buffington, Ind.	....	1.80
Chattanooga, Tenn.	....	2.45*
Concrete, Wash.	....	2.35
Davenport, Calif.	....	2.45
Detroit, Mich.	....	2.15
Hannibal, Mo.	....	1.90
Hudson, N. Y.	....	1.75
Leeds, Ala.	....	1.85
Mildred, Kan.	....	2.35
Nazareth, Penn.	....	1.95
Northampton, Penn.	....	1.75
Richard City, Tenn.	....	2.05
Steelton, Minn.	....	1.85
Toledo, Ohio	....	2.20
Universal, Penn.	....	1.80

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	Plaster Board ⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	....	....	....	....	11.70u	....	....	....
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	....	....	13.50	....	....	....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	....	....	....	....	14.30o	12.30m	....	m9.00@11.00o	....	....	....	....	....
Delawanna, N. J.	....	....	....	....	....	8.00	....	8.25@9.40	....	....	.14½s	.15½s	40.00@41.00
Douglas, Ariz.	....	....	6.00	....	....	....	15.00	....	40.00	13.50	35.00	45.00	....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	....	24.55	20.00	....	....	....
Gypsum, Ohio	3.00	4.00	6.00	8.00	9.00	9.00	20.00	7.00	27.00	19.00	....	15.00	30.00
Los Angeles, Calif.	....	....	7.50@9.50	11.50y	....	....	....	....	....	....	....	....	....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	....	20.00	30.00
Portland, Colo.	....	....	....	10.00	....	....	....	....	....	....	....	....	....
San Francisco, Calif.	....	....	11.65m	13.40r	14.40r	....	15.40r	....	....	....	....	....	....
Seattle, Wash.	6.60	10.00	10.00	13.00	....	....	....	....	....	....	....	....	....
Sigurd, Utah	....	....	....	....	....	....	....	....	21.50	....	....	....	....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	....	....	....	....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 25.00; (b) net; (c) gross; (d) hair fibre; (f) delivered; (h) delivered in six states; (i) delivered on job; (k) sacks 12c extra, rebated; (m) includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (s) per board (t) to 16.50; (u) includes sacks; (v) F.O.B. N. Y. C. and dealer's yard in mill locality; (x) Hardwall plaster; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	......	......
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	18.00@20.00a	......	......
Detroit, Mich.	.16	......	.18
Forest Park, Ill.	18.00*	23.00*	30.00*
Grand Rapids, Mich.	15.00@16.00a	......	......
Graettinger, Iowa	.18@ .20	......	......
Indianapolis, Ind.	.13@ .15†	......	......
Los Angeles, Calif.¶	5¾x3½x12—55.00	7¾x3½x12—65.00	
Oak Park, Ill.	18.00	......	......
Olivia and Mankato, Minn.	9.50b	......	......
Somerset, Penn.	.20@ .25	......	......
Tiskilwa, Ill.	.16@ .18†	......	......
Yakima, Wash.	20.00*	......	......

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton.

Cement Roofing Tile

Prices are net per sq. in. carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red, Yellow, Gray, and Orange	Green, Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35
*End bands	.25	.35
*Eave closers	.06	.08
*Ridge closers	.05	.06

*Used only with Spanish tile.
†Price per square.

Houston, Texas—Roofing Tile, per sq. 25.00

Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00

Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Grand Rapids, Mich.:	Per 100
5x8x12	8.00
5x4x12	4.50

Longview, Wash.:	Per 1000
4x6x12	52.00
4x8x12	64.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 100
5x8x12	7.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa—5 to 36 in., per ton	8.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	......
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@75.00
Milwaukee, Wis.	15.00	28.00@50.00
Mt. Pleasant, N. Y.	......	14.00@23.00
Oak Park, Ill.	25.00	*42.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	......
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	25.00@ 75.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	18.00	25.00@ 80.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	......

†Gray. ‡Red. *Haydenite H. Brick.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	......	.40	.50	.60	.70	......	......	......	......	......	......	......
Gr'nd Rapids, Mich. (b)																	
Culvert pipe	......	......	......	.60	.72	1.00	1.28	1.60†	......	1.92	2.32	3.00	4.00	5.00	6.00	......	......
Sewer pipe (d)	......	......	......	......	......	.63	......	.60†	......	......	......	.58	......	......	......	......	......
Houston, Texas	......	.19	.28	.43	.55½	.90	1.30	......	1.70†	2.20	......	......	......	......	......	......	......
Indianapolis, Ind. (a)	......	......	......	.80	.90	1.10	1.30	......	......	1.70	......	2.70	......	......	......	......	......
Longview, Wash.							Sewer pipe 40% off list; culvert—list										
Mankato, Minn. (b)	......	......	......	......	......	......	......	......	......	1.50	1.75	2.50	3.25	4.25	......	......	......
Newark, N. J.						6 in. to 24 in., $18.00 per ton											
Norfolk, Neb. (b)	......	......	......	.90	1.00	1.13	1.42	......	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Olivia, Mankato, Minn.							12.00 per ton										
Paullina, Iowa‡	......	......	......	......	......	......	......	2.25	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Somerset, Penn.	......	......	......	......	1.08	1.25	1.65	......	......	2.50	......	3.65	4.85	7.50	8.50	......	......
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	......	......	......	......	......	......	......	......	......	......
Tiskilwa, Ill. (rein.) (a)	......	......	......	.65	.75	.85	1.10	1.60	......	1.90	......	2.25	3.40	......	5.50	......	......
Wahoo, Neb. (b)	......	......	......	......	1.00	1.13	1.42	......	......	2.11	......	2.75	3.58	4.62	6.14	6.96	7.78
Yakima, Wash.								$10.00 per ton									

30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced. (d) Eastern clay, list, 72% and 60% off.

21-in. diam. ‡Price per 2-ft. length. (d) 5-in. diam. [1]@1.08. [2]@1.25. [3]@1.65. [4]@2.50. [5]@3.85. [6]@5.00 [7]@7.50.

Florida Concrete Products Men Form Association

REPRESENTATIVES of Florida concrete products firms recently met in Orlando, Fla., and organized the Florida Concrete Products Association. The organization was the result of a preliminary meeting held at Tampa about a month ago. (See ROCK PRODUCTS, May 14 issue.)

Membership in the association is open to all manufacturers of concrete masonry units, regardless of the size or type of building unit that they produce, provided that their products meet the high standards set by the organization. Permanent state headquarters for the association have been established in Tampa, with George L. Reed, secretary.

A luncheon for the 40 representatives attending the meeting was held in the San Juan hotel, and in the afternoon business matters were discussed. The association aims to establish a higher standard for concrete products distribution and manufacture and to utilize the natural resources of the state to the best advantage.

A dinner was held at the Orlando Country Club the night of the organization meeting. It was given to the visiting representatives by the Orlando Concrete Products Association, of which H. C. Brown is president and G. B. Hurlburt, secretary and treasurer. Mr. Hurlburt acted as chairman of the Orlando arrangements committee.

Officers of the Florida Concrete Products Association are as follows: Greene Cannon of the Nutex Brick Co., Tampa, president; G. B. Hurlburt of Newell-Hurlburt Co., Orlando, vice-president, and Fred C. Hedrick of Jacksonville Concrete Products Co., Jacksonville, treasurer. The board of directors is comprised of manufacturers representing every section of Florida.

To Make Colored Face Tile

SEVERAL new features in cement products, among them being colored face tile, are planned by the recently reorganized Duntile Cement Co., Charlotte, N. C. The facing tile in a variety of 40 colors will be offered to the trade, W. A. Brown, president of the company, says. Backing tile manufacture will be continued as heretofore.—*Charlotte* (N. C.) *Observer.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Poured Tile Manufactory in Mississippi

Southern Stonetile Co., Jackson, Produces from 6000 to 7000 Units Per Day

STONETILE is a form of building unit more favored in the southern states than in the northern. It is possible to make stonetile indoors, of course, and plants can be operated in any climate. But the method has proven especially attractive to operators in those sections of the country where the winters are mild.

On a recent trip through the southeastern states a number of stonetile plants were noted by the editor of ROCK PRODUCTS. Fairly typical of such plants in the smaller cities, is the Southern Stonetile Co. of Jackson, Miss. It produces from 6000 to 7000 units per day and has built up a good market for all that it is able to make.

Stonetile, as the reader probably knows, is the name of a poured tile made by a patented process. It is usually made out of doors and it requires a considerable area for the beds on which it is made. Each bed consists of two runways of concrete, on which the machine bearing the molds and the buggy for concrete run. Between these runways is a long narrow bed of sand on which the molds are placed before the concrete is poured. After the molds are filled they are lifted, leaving the freshly cast tile on the sand bed. The molds are moved to another position and more tile are cast, and so on until the bed is filled. When the tile are hard enough to handle they are picked up and piled to finish curing. The whole operation was described in detail in ROCK PRODUCTS, December 12, 1925.

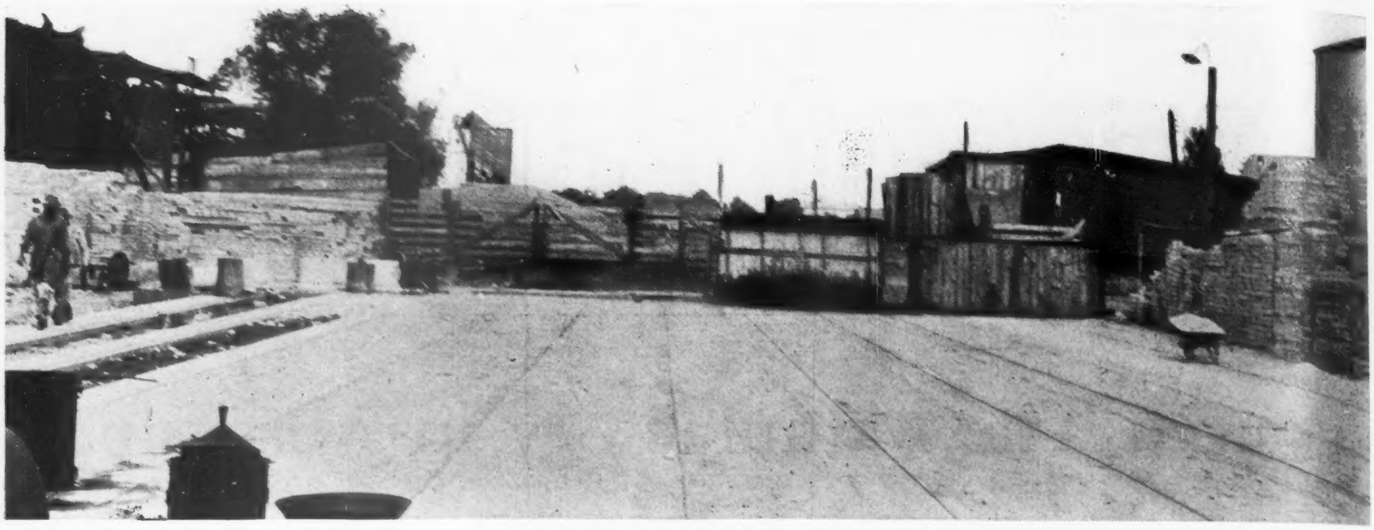
The beds on which the tile are cast have to be of such a nature that they will absorb moisture and a coating of fresh sand is laid before casting begins. At the Southern Stonetile plant the beds are made of cinders, coarse pieces (clinkers) being used as much as possible to provide good drainage, which is essential. On one bed an experiment was being tried with a coating of coarse sand with just cement enough to stick it together as a dressing for the top. It had not been in use long enough so that results could be determined satisfactorily.

The aggregates used at this plant are sand, pea gravel and crushed slag. The sand and pea gravel come from regular producers at Hattiesburg, Miss., and the slag is from Birmingham, Ala. The pea gravel and slag are generally used half and half for the coarse aggregate. The concrete is mixed in a Jaeger 1-yd. mixer driven by a gasoline engine and the water content is such that the slump is about ½ in. or a little less. With such a low slump the fresh cast tile do not change their shape when the mold is stripped from them. As the water ratio is practically that which gives the greatest strength to cement, the resulting concrete has a high strength in compression.

Jackson is in a clay products country and the plant has to meet severe competition from clay brick and clay tile. The fact that such competition can be met is the best evidence of the quality of the product. As is the custom where winters are

Concrete pipe for culverts are another product made at the plant

Piles of curing tile in the yard—the even appearance is sufficient indication of the trueness to dimensions and shape



Casting yard at the Southern Stonetile Co. plant at Jackson, Miss.

mild, a great deal of this tile is used for buildings without stucco or other finish on the outside, and as it has a low permeability rains do not beat through it.

Concrete Pipe Also Made

Concrete pipe, for culvert work principally, is another product of this plant. They are made of a moist mix, similar to that used in making stonetile, and tamped into the molds by hand.

The plant is neatly kept and things are well looked after. The machine for handling the molds and the concrete buggy are thoroughly cleaned and placed in a shed when not in use. Molds are oiled in a concrete tank which is kept covered when not in use to keep out dirt and sand. The molds are received on one side of the tank, dipped in the oil and piled on the other side for draining as shown in the picture. Before this tank was installed molds were oiled with a brush. The tank does the work with less labor and insures that the oil covers every part of the mold.

The picture of the tile piled for curing and for storage is sufficient evidence of the uniformity and the trueness to shape and dimension of this plant's product.

W. R. Alford is the plant superintendent. The company's main office is in Jackson.

Type of mixer used to prepare the concrete for the tile

Plaster Adds Fire Protection to Hollow Clay Tile

FIRE tests of hollow, load-bearing, clay, wall tile have been completed at the U. S. Bureau of Standards and a synopsis of results are published in the April *Technical News Bulletin* of the Bureau. The following paragraph is of particular interest and significance to lime and gypsum manufacturers:

"Effect of Plaster.—Numerous tests with fire exposures of one and one-half hours or longer duration show that, properly applied, gypsum plaster of acceptable grade, and also cement plaster with lime substitutions of 50% or less by volume, will stay in place throughout fire exposures up to the fusion point of the plaster. These tests also show that many unplastered walls which would be damaged by short fire exposures would suffer only minor damage if plastered. Later tests of furred walls show that the use of furring and plaster will further decrease the susceptibility to damage of the structural part of the wall."

Molding and other machinery under cover when not in use

The molds after oiling are placed in this concrete tank for draining

New Machinery and Equipment

Spur Gear Speed Reducer with Bath and Forced Feed Lubrication

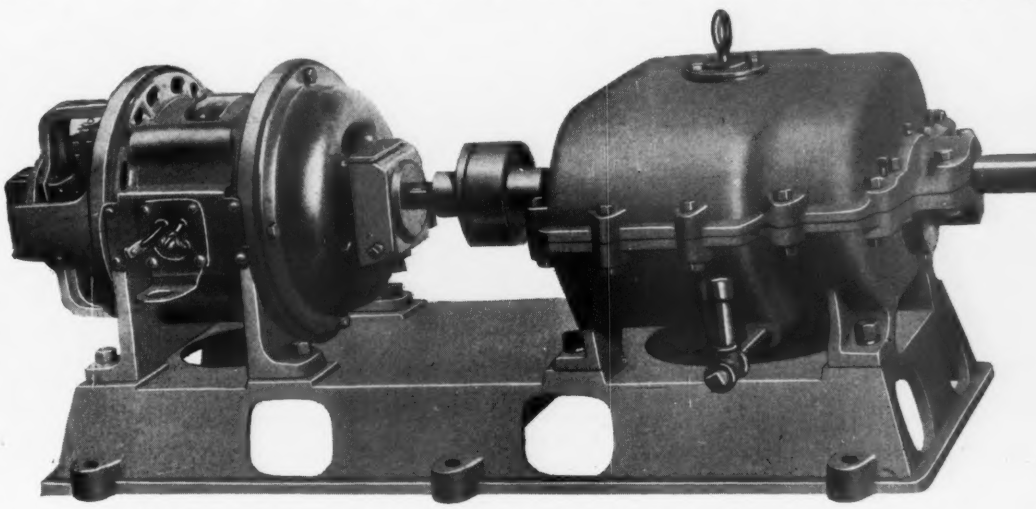
A NEW spur gear speed reducer, simple in design and of sturdy construction, is announced by the Huron Industries, Inc., Alpena, Mich. The manufacturers claim that it is especially suitable for use in driving cement mill grinding equipment, rotary driers, etc., and with the usual equipment in rock products plants.

The housing is in two parts, a cover and the lower section to which it is bolted. Removal of the cover exposes the reducing mechanism, readily accessible for repairs, adjustments, etc. The joint surfaces have been machined so as to make an oil-tight fitting.

The reduction gears are of heat-treated steel cut from forged steel of special alloy steel castings. The shafts are of steel, machined and designed for an overload, the makers say. Bushings and bearings are of bronze.

The outstanding feature of the reducer, according to the manufacturers, is its lubricating system. This is said to consist of an improved positive force-feed and bath system, which is claimed to assure a uniform flow of cool oil to all bearings and wearing surfaces. At the same time economy in oil is claimed for the system. This system employs a specially designed suction pump which forces oil from an oil compression reservoir within the bridge wall of the housing to the main bearing and shafting through radial openings to the axis. From there it is carried through the shafting to points opposite all bearings and is then emitted through radial openings to the wearing surfaces. In addition, the bath from the gears is said to supply oil to the bearings through oil holes provided.

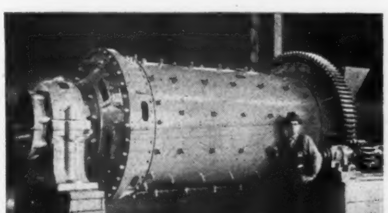
The speed reducer is made in three standard styles, of two- and four-reduction types, with various reduction ratios and horsepower. Special sizes can also be furnished. Couplings of the rigid or flexible type are furnished in required sizes, if desired. The machine can be furnished with or without provisions for outboard bearings, allowing the use of chain and gear drive where installations require it.



New spur gear speed reducer direct connected to electric motor

New Conical-Ended Rod Mill

THE conical-ended rod mill is a recent development of the Hardinge Co. of York, Penn. The outstanding feature claimed for this design is the conical ends, which are responsible for the alignment of the rods within the mill during the grinding process. This feature is said to eliminate the heavy pounding on the heads, and the consequent high liner wear. The large space in front of the rods facilitates access of feed to the whole mass of rods, and likewise the space at the discharge end, it is claimed, increases the discharge rate, as there is no obstruction from the rod ends to hinder free flow of the product.

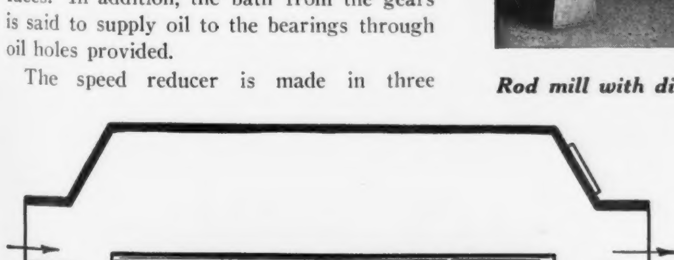


Rod mill with discharge ports open

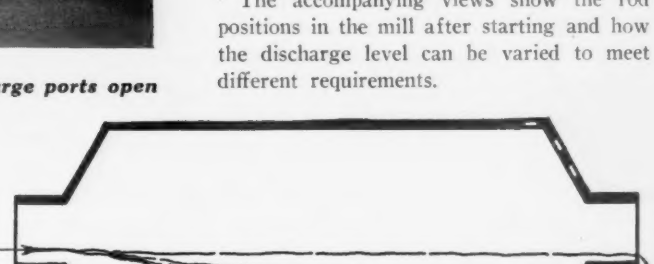
A variable discharge level is provided for by discharge ports, which can be opened or closed to suit the particular grinding problem.

The mill is especially adaptable for grinding of sand-lime mixtures, the manufacturers say, for its construction allows the efficient grinding of materials which carry moisture in such proportions that the mass is not quite fluid—a condition particularly true of sand-lime brick making. The conical shape of the mill is said to insure structural strength and light weight. Fairly soft material can be reduced from ½-in. maximum to about 20 or 30 mesh with a minimum of fines, the manufacturers say.

The accompanying views show the rod positions in the mill after starting and how the discharge level can be varied to meet different requirements.



Position in conical-ended rod mill after starting showing the open spaces at both feed and discharge ends



Showing how the discharge level can be varied to meet different requirements

Some New Applications of Roller Bearings in Rock Products Industry

By L. M. Klinedinst
General Manager, Industrial Division, Timken Roller Bearing Co., Canton, Ohio

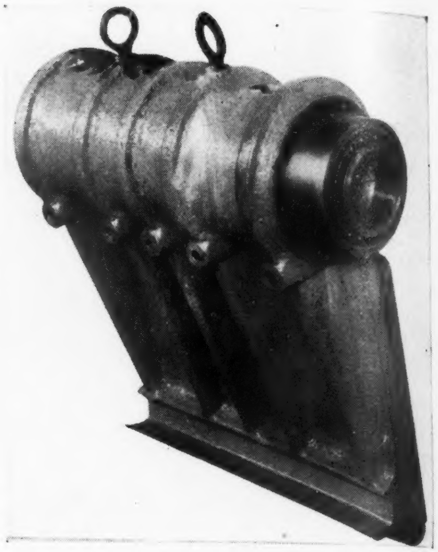
IN line with the general need for increased production, efficiency and economy of machine operation throughout every industry, is the widespread adoption of roller bearings by machinery manufacturers. The use of bearings of this type, which first had general acceptance in automobile manufacture, has now spread to such an extent that hardly a field of industry can be named where they are not to be found. The rock products industries are no exception; the extremely hard service that machinery in these fields is called upon to perform created an ideal situation for the replacement of bearings of older and less satisfactory type.

L. M. Klinedinst

Before citing some actual examples of machines in which Timken tapered roller bearings are being used, it would perhaps be well to outline some of the characteristics that make them so suitable for these uses. They are built on the tapered roller principle, which makes it possible to carry not only the radial loads, but thrust loads as well. When bearings of other types are used in positions where loads of both kind are encountered, it is of course necessary to use thrust washers or separate thrust bearings. One tapered roller bearing, however, does both jobs. Then again, these roller bearings are so designed that the rolls are positively aligned, being dependent on the cage only to space them. By that means friction is almost entirely eliminated. The motion is rolling, in sharp contrast to the continual sliding action of the shaft against a plain bearing, which it is easy to see, consumes a great deal of power. Loads are distributed over the entire length of the rollers, which makes possible the use of bearings of smaller overall dimensions than when those of other types are used, permitting smaller housings and allowing the machines themselves to be less bulky. All motion is confined within the bearings themselves, doing away with any wear on shafts or hubs; and as the bearings are made of special analysis electric furnace steel, produced in our own steel mills and designed especially for the purpose, wear within them is almost unknown. Lack of friction, too, of course, has a great deal to do with this lack of wear, which makes bearing replacements relatively infrequent, and in many cases eliminates this necessity entirely.

A rock crusher, manufactured by Alloy Steel & Metals Co. of Los Angeles, which they have named the "Roller Bear," recently underwent a severe test, operating 24 hours a day for the greater part of two months. It was found that the crusher when equipped with Timken roller bearings, as compared with the plain bearing equipment formerly used, required only about one-third as much power to operate. Savings on belting and motors are notable. Easy starting qualities have eliminated any strain or overload on the crusher when starting it; and lubrication, which was always a source of trouble with the plain bearings, has—according to the manufacturer—been made almost unnecessary. The capacity of the machine has been greatly increased, as the roller bearings have made it possible to operate at higher speeds. Approximate comparative figures, covering the performance of the machine with plain bearings and with roller bearings, are extremely interesting:

	Plain Bearings	Roller Bearings
Speed.........	250 r.p.m.	350 r.p.m.
Power required.....	40-50 hp.	15-20 hp.
Output........	17 tons per hr.	22-25 tons per hr.



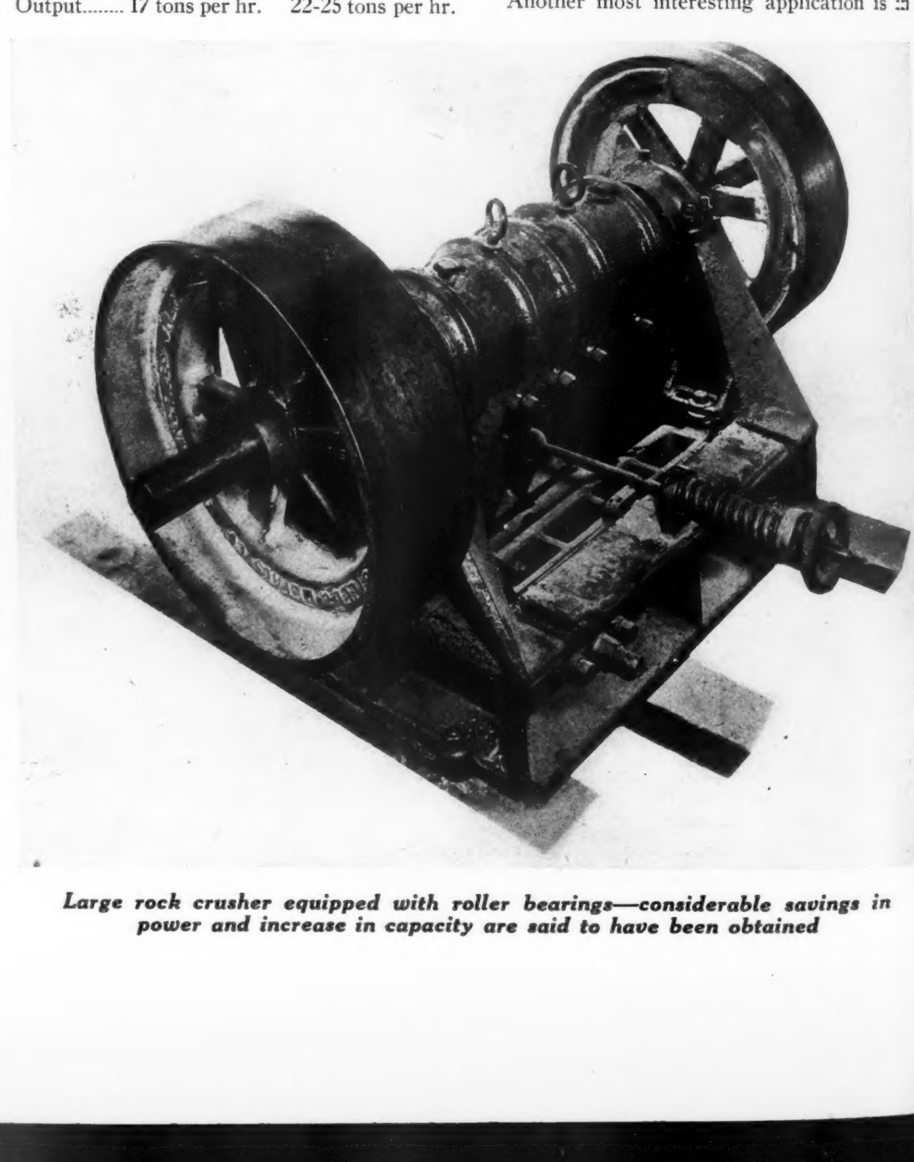
Movable jaw showing the roller-bearing mounting

These figures speak eloquently for the advantages of using the roller bearings.

Hammer Mill with Roller Bearings

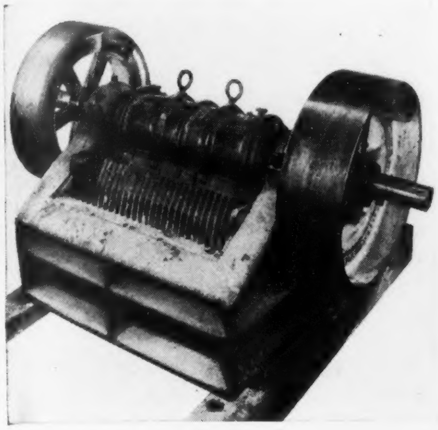
A new swing hammer mill with Timken roller bearings of the railroad type has been recently brought out by the Bonnot Co., Canton, Ohio. This mill, illustrated herewith, was described in the New Machinery and Equipment section, ROCK PRODUCTS, April 2, 1927.

Another most interesting application is in



Large rock crusher equipped with roller bearings—considerable savings in power and increase in capacity are said to have been obtained

a compeb mill, the largest ever built, manufactured by the Allis-Chalmers Manufacturing Co. This mill is to be used for grinding cement, and the bearings used on it are also the largest the Timken Roller Bearing Co. have ever produced. They have a bore of 42 in., an outside diameter of 61 9/16 in., and weigh more than two tons. At 30 r.p.m. they have a capacity of 2,750,-000 lb. The principal advantage of the roller bearings in this application is the



Jaw crusher with roller bearing mounting

material reduction of the overall length of the machine, since the bearings are but 13¼ in. wide. Bearings of large size and unusual capacity have been built for some time, and are used in many applications in steel mills and other types of equipment where shafts of unusual size and loads of exceptional magnitude require bearings capable of withstanding the severe service for long periods without renewal.

In conveyors, roller bearings are being used by a great number of manufacturers. On a roller bearing-equipped Stearns conveyor operated by the Peerless Portland Cement Co., it was found possible to unload 10,000 tons of stone in less than six hours, without interruption of any kind, and with no indication of excessive strain or heating.

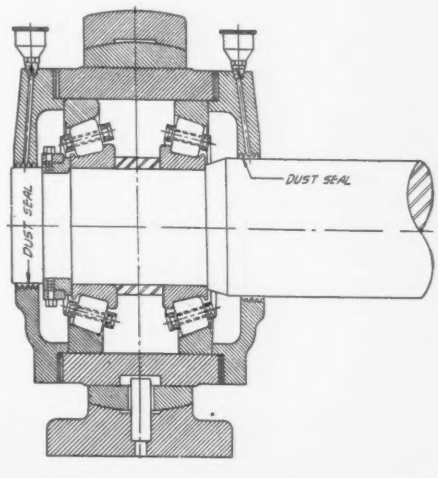
Another example of using roller bearings under severe conditions is on the Rotex screen, built by the Orville-Simpson Co., of Cincinnati. This machine is subject to unusually heavy shock loads, but is able to handle up to 72 tons of rock an hour.

An interesting test was one conducted by Variety Iron Works, of Cleveland, on a roller bearing-mounted idler pulley. After running for one billion revolutions, the bearings were found to be in perfect condition, and did not even require additional grease, although the pulley had then given the equivalent of thirty years of average conveyor service.

These examples given are just a few that show to only a comparatively small extent the wonders roller bearings are doing in the way of increasing capacity for production, reducing power required for operation, and

Mammoth bearing for large compeb mill

making for greater efficiency and lower maintenance costs on machines used in the rock products industries. Other pertinent applications are to steam shovels, locomotives, tramways, engines, and quarry cars, all of which have been made better able to meet the demands of present-day requirements in these industries because of the use of roller bearings.

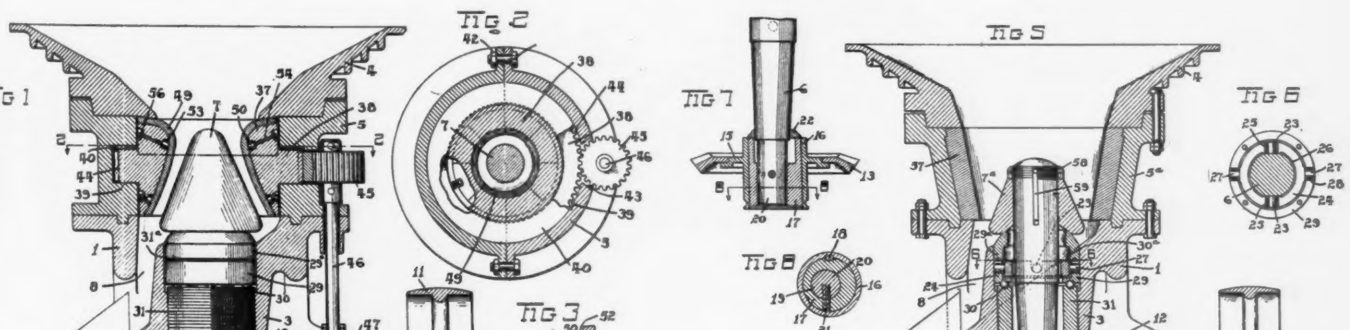


Roller-bearing mounted hammer mill

Spiderless Ball-Bearing Gyratory Crusher

A PATENT (U. S. No. 1,609,594) has been recently granted Harvey S. Anderson, Waterville, Iowa, which covers several improvements to the Gates type of gyratory crusher. In the improved type, the spider has been eliminated to allow feeding greater amounts of material to be crushed. The shaft is hung below the head in the crusher frame, bringing the fulcrum close to the crushing point. This is said to increase the leverage and reduce the power required to crush the rock. The concaves are carried by a rotating collar or runner which makes them revolve about the crusher head. The head is mounted on ball bearings. The centrifugal force created, the inventor states, carries the stone into and on through the machine at greater speed—increasing the output and decreasing the amount of dust made. The middle section can be installed on any crusher now in use and operated by putting a second pinion on the counter shaft.

With reference to the accompanying dia-



Details of improved gyratory crusher with ball-bearing head

grams, Fig. 1 is a vertical section elevation of the gyratory crusher. Fig. 2 is a transverse section on the line 2—2 of Fig. 1; Fig. 3 is a detail view showing the manner of connecting the wearing plate to the rotatable collar; Fig. 4 is a view taken on the line 4—4 of Fig. 3; Fig. 5 is a vertical sectional elevation of a modified form of crusher; Fig. 6 is a transverse section on the line 6—6 of Fig. 5; Fig. 7 is a vertical section on the line 7—7 of Fig. 5, and Fig. 8 is a section on the line 8—8 of Fig. 7.

The gyratory shaft 6 is mounted in the tubular bearing portion 3 for universal movement so that the crushing head 9 may move to one side and then the other concomitant with the rotation thereof for exerting a crushing force in the direction of the spacer block 5. For this purpose the shaft 6 is formed with diametrically opposed trunnions 23 and surrounding the shaft 6 is a collar 24 having apertures 25 to receive the trunnion 23. Interposed between the shaft 6 and collar 24 are bushings 25 for taking up wear and formed on the collar 24 are diametrically opposed trunnions 27 extending into apertures 28 in a ring 29 which is mounted for rotative movements in the tubular bearing portion 3. The ring 29 is supported by ball bearings 30 on a screw threaded adjusting sleeve 31 which is threaded into the tubular bearing portion 3 and is held in adjusted position by means of a lock nut 32. Surrounding the shaft 6 above the ring 29 is a collar 29a which is provided with a tapered out end to fit against the crushing head 7 to prevent dirt and dust from entering the universal joint. The collar 29a may be spaced from the ring 29 by an annular plate 30a having spacer elements 31a.

In the modification shown in Fig. 5 the spacer block 5a is not rotatable and a bushing member 57 is provided on the inner surface of the block 5a and this bushing may be of any suitable wear resistant material such as manganese steel. In this form the conical crushing head 7a is somewhat smaller than the conical crushing head 7 and is held in place by a nut 58, a key 59 preventing relative rotation between the crushing head and the shaft. The remaining construction of this form of crusher is substantially the same as heretofore described.

Use of Ball Bearings in a Modern Cement Mill

THE use of frictionless bearings in various kinds of machinery and equipment in cement mills has been referred to many times in ROCK PRODUCTS pages, as incidental to the descriptions of numerous plants. What follows, from the *Dragon*—the house organ of the Fafnir Bearing Co., New Britain, Conn.,—is of interest in this connection as summarizing such use of ball-bearings. (A complete description of the plant of the New Egyptian Portland Cement Co., from which much of the general information in the following article is obtained, was published in ROCK PRODUCTS, April 4, 1925.)

The New Egyptian Portland Cement Co., whose plants are located at Port Huron and Fenton, Mich., uses a limestone and clay mixture. The limestone, ¾ in. screenings requiring no preliminary crushing, is received at the Port Huron plant in 10,000-ton boat loads and carried to the rock storage building on a belt conveyor (see general plan, Fig. 1). The conveyor carriers are ball bearing-equipped.

This conveyor delivers the stone to a shuttle conveyor in the rock storage building, which runs on tracks the entire length of the building; 72,000 tons of rock and 15,000 tons of clay can be stored in this building. The wheels of this conveyor were originally on plain bearings, which moved so hard that the aid of a large crane was required to operate it. After changing the wheels to ball bearings, using the Fafnir long inner ring loose pulley application (Fig. 2) the conveyor is now easily moved to any location; the shuttle conveyor with its ball bearing equipped wheels is shown in the illustration below (Fig. 3).

The limestone is next deposited in hoppers from which it is fed to the compartment tube mills for raw grinding with the clay, which has also been delivered to the compartment mill from the clay tanks in the proper proportions by a ferris wheel feeder.

From this point on the material is conveyed almost entirely by the pneumo-electric pumping process, which aids greatly in the elimination of dirt and dust and has been developed to a remarkable degree by the New Egyptian Portland Cement Co.

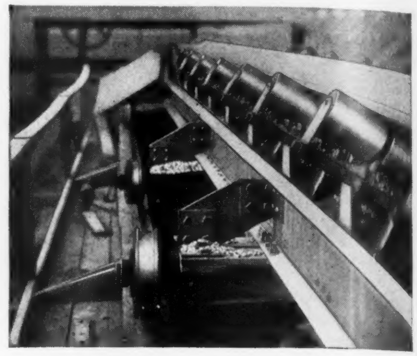


Fig. 3. Shuttle conveyor with ball-bearing equipped wheels

The discharge from the tube mills goes to a sump, whence it is pumped to slurry tanks, via ball-bearing pumps of their own design. Here the mixture can be corrected if necessary.

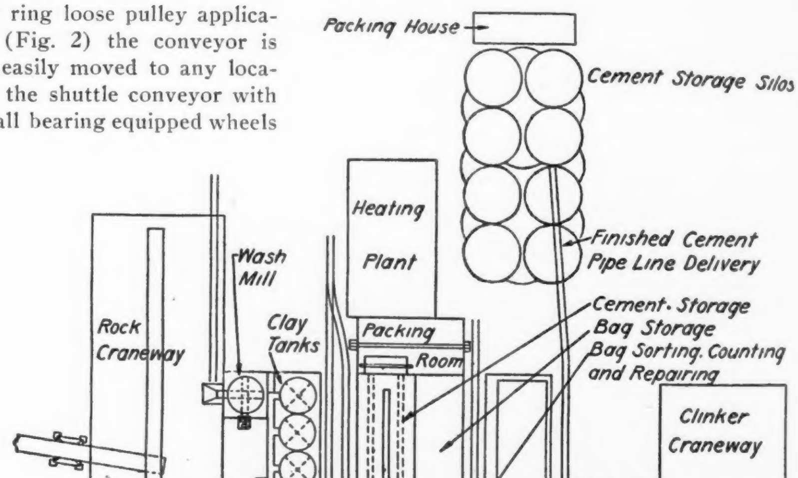


Fig. 1. General plan of the Port Huron, Mich., plant of the New Egyptian Portland Cement Co.

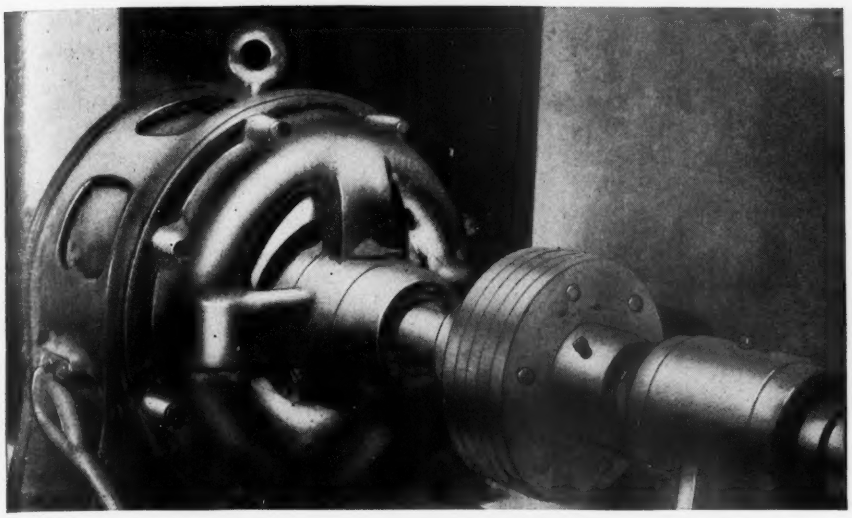


Fig. 7. *Double pillow blocks on silo mixers*

The cement clinker from the kilns goes to the clinker storage building, where also are stored the coal and gypsum; 75,000 bbl. of clinker can be kept here.

Material in the clinker storage is handled

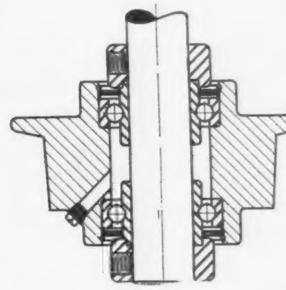


Fig. 2. Shuttle conveyor section showing the wheel mounting

by an overhead crane. Owing to the great heat and the dust, the average life of sleeve bearings in crane motors was six weeks. A replacement was made using the long inner ring ball bearing, (see Figs. 4 and 5) and the bearings were still running after a year and a half; they are greased only twice a year, a considerable saving in time and labor in such a location. Note the simplicity of the assembly which permits of taking the housing off separately for inspection without exposing the bearings. Fig. 6 shows one of the motors with ball bearings in

Fig. 5. Crane motor, showing housing and bearing removed

Slurry from the tanks is pumped directly to the kilns. These are of the rotary type, 200 ft. long and are fired by the Acker-Cheesman combustion system which has increased their capacity 40%, turning out in 1924, 1685 bbl. per day. This system is named after its inventors, J. A. Acker, consulting engineer and assistant general manager and R. D. Cheesman, consulting chemist, of the New Egyptian Portland Cement Co. The kilns burn the raw mix to cement clinker.

Pulverized coal is used for fuel, burning with a temperature between 2500-deg. to 3000-deg F. In the Port Huron plant this is conveyed to the kilns by a Fuller-Kinyon pump—equipped like all these pumps with ball bearings. Blowers are sometimes used for this purpose, and of course have to contend with great heat as well as cement and coal dust.

At the Fenton plant the superintendent told the Fafnir salesman that if ball bearings would last for three months on a large Sturtevant "Turbo" vane blower they would pay for themselves. Fafnir pillow blocks were installed, and at last notice the ball bearings had run day and night for two years and were still running.

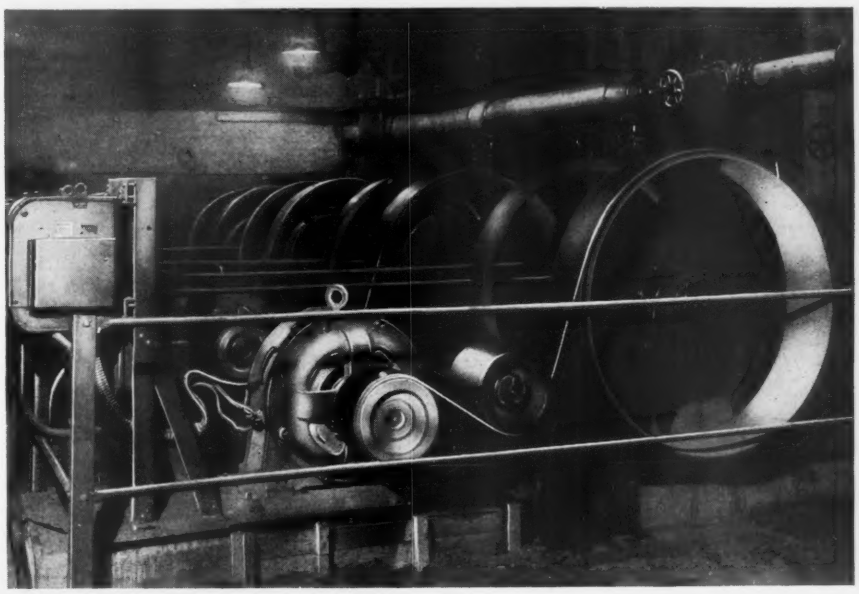


Fig. 9. Ball bearing installation in idler pulleys on air compressors

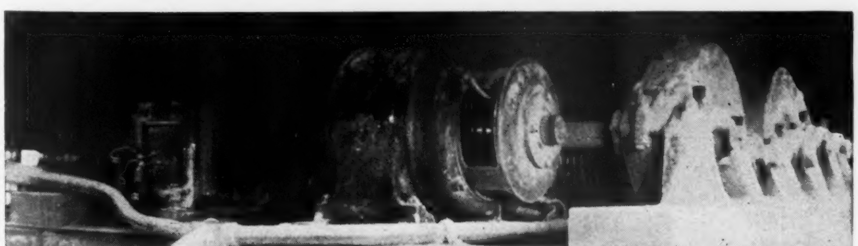


Fig. 6. One of the motors equipped with ball bearings in operation on the crane

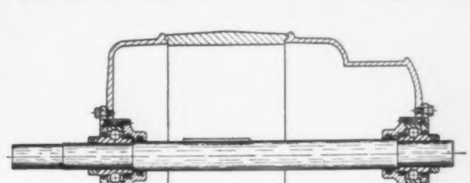


Fig. 4. Crane motor section showing the mounting

operation on the overhead handling crane.

From clinker storage the clinker goes to the finish grinding mills, an exact counterpart of the raw grinding. Ball-bearing equipped Fuller-Kinyon cement pumps deliver the finished cement to either the packing room or the storage silos. The mixers in the silos are equipped with double pillow blocks (Fig. 7) and the mixer truck axles have been changed to the long inner ring ball bearing (Fig. 8).

A recent installation in connection with the new silos consists of ball bearing-equipped Fuller-Kinyon pumps mounted on ball bearing-equipped conveyors, so that cement can be drawn out of any silo direct to the packing plants. In the packing plants the cement is put into bags ready for shipment.

The original Fafnir installation in this plant was made in the idler pulleys on air compressors in 1923 to replace bearings which had been giving an average service of three months. This original ball bearing installation is still running and is illustrated in Fig. 9.

In this space it has been impossible to describe more than briefly the various ball bearing applications. It is hoped, however, that some idea of the process and of the possible extent to which ball bearings can increase its efficiency has been conveyed. The New Egyptian Portland Cement Co. would doubtless be glad to give further details on either of these subjects to any interested reader.

Ball Bearings on Mine Motors and Pumps

IN the July 10, 1926, issue of ROCK PRODUCTS there appeared an interesting and instructive article covering the use of ball bearing motors in the rock products industries by F. H. Bernhard of the Fairbanks, Morse Co. It discussed in a thorough manner just what advantages might be expected from their use. Recently, *Mining and Metallurgy* carried an article by W. F. Boericke on the use of ball bearings on mine pumps and motors. Because of the additional information contained in this article which is certain to be of interest to rock products producers, the following abstract in part is reproduced.

Mr. Boericke says:

At one of the large mining companies which has for a number of years taken a leading part in pioneering new developments in mining machinery, ball bearings have been gradually supplanting the conventional type of sleeve bearings on many of their motors, centrifugal pumps and other machines in the mines. They have found favor because of increased operating efficiency and reduction in lubrication costs.

Ball bearings were first introduced at this mine on mine motors. These were of the a.c. type, and ranged from 1 to 125 hp. and from 860 to 1740 r.p.m. With the old type of sleeve bearing considerable trouble had resulted from failure to lubricate the bearing properly. This was particularly the case in isolated underground installations, where it was inconvenient to get around regularly and give proper supervision to the oiling, with the result that lubrication frequently had to be entrusted to careless hands.

Fig. 8. Ball bearing on truck of mixer in silo

Ball bearings have been introduced on centrifugal pumps, with sufficient success as to justify their retention, and their gradual substitution for the old style of bearings on pumps now in service. The advantages found in lubricating motors apply equally here. An increase in pumping efficiency is obtained by securing a uniformly correct position for the impellers through their use. With the sleeve type, there is danger of wear in the bearing, allowing the impeller to drop down, causing loss of efficiency and wear in the shaft. In most cases the pumps used are direct-connected to the motors. It is poor policy to use ball bearings on one and not on the other of a series, although it is possible. In this mine a general water supply pump and the direct-connected 100-hp. motor are both equipped with ball bearings. Correct alignment of motor and pump shafts when the pump is direct-connected to the motor is important. With sleeve bearings, misalignment often results in considerable wear on the shaft and increased power consumption.

Other instances where ball bearings have been substituted for sleeve bearings in the mine include their use on rock drills, where the machines show less friction and a longer life, in compressed air column hoists, and in scraper hoists. They are also used on storage battery locomotives, which are subjected to hard and continuous service. In the mill, the use of ball bearings in the motors has eliminated a great deal of trouble arising from severe dust conditions there, which, with sleeve bearings used to necessitate replacing the latter an average of once every four months.

Savings in Use of Ball Bearings

An attempt has been made to get figures on the savings effected by the substitution of ball bearings for sleeve bearings on six motors at this company's plant. Of the six motors, four are connected to line shafting and two are direct-connected to centrifugal slime pumps. The motors are 35 hp., 860 r.p.m., 3-phm. 60-cycle, 440-volt. type. The compilation below was made by the S. K. F. Industries, Inc., who furnished the particular bearings used.

DATA SHOWING SAVINGS FROM ACTUAL CHANGE-OVER FROM SLEEVE TO BALL BEARINGS

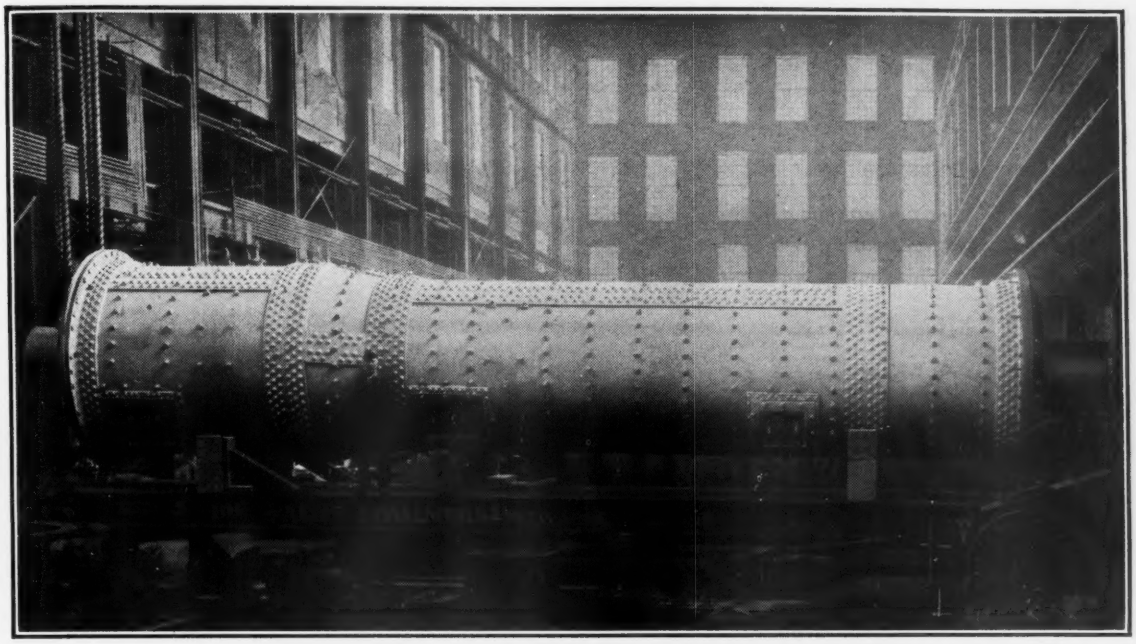
1. LUBRICANT		
Cost per year (sleeve bearing) 54 gal. at 40c	$21.60	
Cost per year (ball bearing) 12 lb. at 14c	1.68	
Net saving in lubricant per year		$19.92
2. LABOR FOR LUBRICATION		
Cost per year (sleeve bearing)		
Daily work—187.2 hr. at 40c	$74.88	
Monthly work—36 hr. at 40c	14.40	
	$89.28	
Cost per year (ball bearing) 24 hr. at 60c	14.40	
Net saving and labor for lubrication per year		74.88
3. REPAIRS AND BEARINGS RENEWAL		
Cost per year (sleeve bearing) 36 bearings at $2.25	$81.00	
Cost per year (ball bearing)	20.00	
Net saving repairs and renewal		61.00
Total saving per year		$155.80
Saving per motor		25.97

Material Handling Equipment

A NEW general catalog, No. 30, of almost 1000 pages in which is presented considerable data on modern material handling equipment has recently been brought out by the Stephens-Adamson Mfg. Co., Aurora, Ill. In it are illustrated the variety of equipment manufactured by the company and complete information regarding dimensions, weights and engineering data to assist rock products operators in the selection of machinery. Many tables and definitions of units used in engineering calculation, etc., are also given. The catalog is available to interested parties by writing the Stephens-Adamson Co. The price is $3.

Reduce Transformer Prices

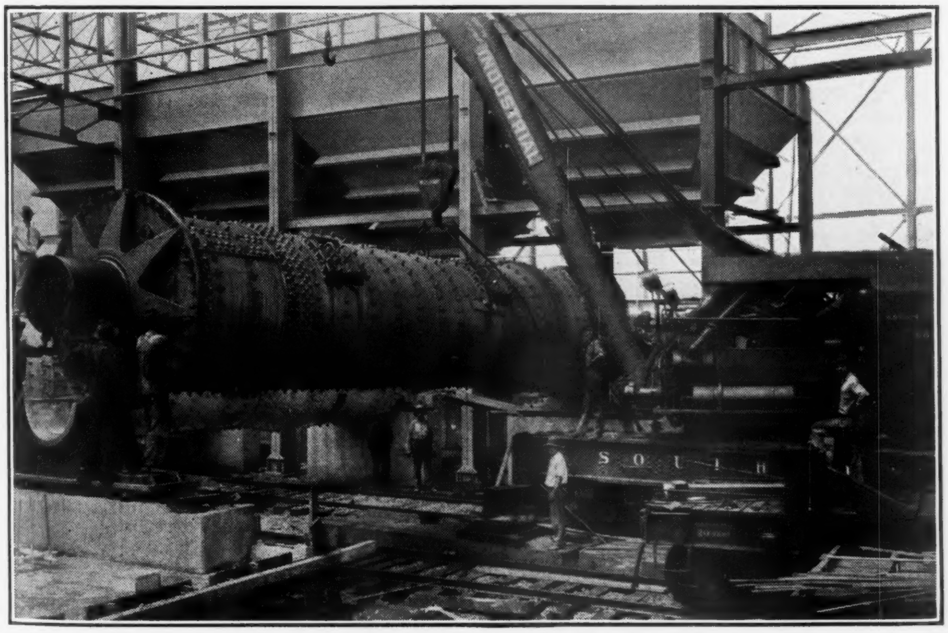
THE General Electric Co. announces a 5% reduction in prices of distribution transformers and small power transformers, effective June 1. This reduction is the sixth since 1920. On certain types of large transformers, reductions which average 5% for this class of product have also been made. According to J. G. Barry, vice-president, these reductions are made possible by economies from improved engineering and manufacturing methods and standardization.



No. 8740 Wet Compeb Mill loaded on special car in our shop.

Manufacturing Facilities *Only* Will Permit This

All Allis-Chalmers Compeb Mills for domestic shipment are assembled complete in our shops as represented by these photographs. All linings for interior of mill installed, shell linings being backed up with zinc. Heads attached. This method of shipment insures purchaser of accuracy and eliminates field expense of assembling.



No. 8740 Clinker Compeb Mill being unloaded from car and placed directly on foundations in customer's plant.

ALLIS-CHALMERS

MILWAUKEE, WIS. U.S.A.

News of All the Industry

Incorporations

Cumberland Lime Co., Wilmington, Del., $30,000.

John N. Box Sand Co., Grisham, Ind., $3,000. Operate sand and gravel pits. Nels Anderson, Grisham, Indiana agent.

Atlantic Cement Products Co., Hicksville, N. Y., $250,000 preferred stock and 10,000 shares of common stock.

Jersey Limestone Quarries, Hamburg, N. J., $250,000 preferred stock and 5000 shares of common stock.

Cuban-American Rock Asphalt and Paving Corp., Wilmington, Del., $750,000. To carry on a general rock asphalt mining and paving business.

Wynne Sand and Gravel Co., Little Rock, Ark., $65,000. D. H. Hamilton, E. C. Bellamy and S. C. Walker.

Lime Rock Asphalt Co., Memphis, Tenn., $12,000. W. T. McLain, John Brown and L. D. Dejach.

Liscio Marble and Tile Works, Inc., Bronx County, N. Y., $100,000. Quarry marble, etc. C. Liscio.

Belle-Rose Cement Block Corp., Brooklyn, N. Y., $10,000. A. M. Chamow, 51 Chambers St., Manhattan.

Charlotte Quarry Co., Charlotte, N. C., $50,000. To quarry, buy and sell rock and minerals. J. J. McNeil, Mrs. M. M. Schiltz and E. F. McNeil.

Pioneer Memorial Co., Portland, Me., $10,000. To operate granite, marble and slate quarries. F. J. Cameron, Maurice A. Rudman and C. F. Moore, all of Portland.

Terry & Lewis Sand and Gravel Co., 311 S. Prairie Ave., Galesburg, Ill., $50,000. Produce and sell gravel, etc. H. F. Campbell, W. E. Terry and W. E. Terry, Jr.

Indian Gravel Co., 400 Market St., Mount Carmel., Ill., $25,000. Produce and deal in sand, gravel, etc. George Daily, George Dunkel, Noble L. Eastham and Walter R. Kimsey.

Quincy Sand and Gravel Co., Quincy, Mass., $100,000 with 1000 shares at $100 per share. Salvatore Naclerio, Joseph Mira and Domenico Bielli of 273 Liberty St., Quincy.

Quarries

Dalles Crushed Rock Co., The Dalles, Ore. The recently organized company, reported in Rock Products, April 16 issue, is now in operation supplying crushed basaltic rock for commercial purposes.

Fiborn Limestone Co., Marquette, Mich., is installing a crusher at their quarry to be used for crushing the screenings making them suitable for agricultural use.

Welch & Moynihan, Newburyport, Mass., are constructing a rock crushing plant at the quarry they recently purchased.

Cleveland Stone Co., South Amherst, Ohio, officials and employes contributed $200 to the flood relief fund for the Lorain area.

A. C. Sand Co., Arkansas City, Kan., is said to be in charge of the operation of the quarry near here located on property owned by the Silverdale Gravel Co.

Duluth, Minn. The city council is contemplating the purchase of a rock crusher as part of the plan to remove the Point of Rocks and at the same time furnish the city with construction material.

Yock & Roberts Co., Black Horse, Penn., have recently installed an electric loading machine capable of loading 2 yd. per min.

Union Rock Co., Los Angeles, Calif., is taking bids for the construction of a bunker to cost approximately $45,000.

Missouri Marble Co., Rush Rower, Mo., property is reported to have been sold to the Alba Realty Co. of St. Louis.

Sand and Gravel

Bayfield County, Wis. The county road committee has purchased a portable rock crusher and screening machine for the county gravel pit near Washburn, for supplying crushed stone for road work.

Miami County, Ind. The county rock crusher has been set up at the Joe Koch gravel pit near Macy, preparatory to starting an extensive road graveling and repairing program.

Wabash, Ind. A new gravel pit has been opened up on the Hugh Crumley property, the gravel to be used on the county roads.

Tama County Sand and Gravel Co., Tama, Iowa, has been sold by Glen S. Buchanan and C. E. Webb to E. E. Harlan and J. B. Maiden, it is stated.

Atlas Rock Co., Oakland, Calif., was the host to about twenty citizens of Toulumne county on an inspection tour of the company's gravel operation on the Old Stanislaus river last week.

Kraft & Kottinger, Upton, Calif., have just completed the construction of a rock crushing plant at their pit near here.

Elkhart Sand and Gravel Co., Elkhart Lake, Wis., recently sold a section of its property to the Quit Qui Oc Golf Club.

Indianapolis, Ind. The city council has an ordinance up for consideration which would prohibit the dredging of gravel from the bed of a stream for at least 1000 ft. above any bridge.

Cement

Northwest Portland Cement Co., Seattle, Wash., is asking for bids on electrical and plumbing work for their office building at the new Grotto, Wash., cement plant.

Lawrence Portland Cement Co., New York, has appointed the O. S. Tyson & Co., Inc., advertising agency of New York to direct the advertising of its Dragon brand portland cement.

Manitowoc Portland Cement Co., Manitowoc, Wis., was the host recently to the members of the Builders Exchange of Milwaukee at an inspection tour of the cement plant and luncheon.

Phoenix Portland Cement Corp., Birmingham, Ala., recently entertained the Birmingham, Fairfield and Bessemer Kiwanis clubs by a picnic lunch and an inspection tour of the company's plant.

Trinity Portland Cement Co., Dallas, Texas, is installing a new 8x30-ft. ball, raw-grind mill at its Fort Worth, Texas, wet process cement mill.

North American Cement Corp., Albany, N. Y., was host to the Catskill, N. Y., Rotary Club at its plant here recently.

Volunteer Portland Cement Co., Knoxville, Tenn., has let the contract for 1600 ft. of sidetrack for their new cement plant near Caswell, Tenn., to the Dempster Construction Co. at an estimated cost of $15,000.

Cement Products

Newell Contracting Co., Birmingham, Ala., has purchased a site on 5th Ave. between 33rd and 36th Sts., where it contemplates the erection of a new plant to consist of cement mixing and asphalt heating plants and a warehouse for storing materials.

Julius H. Conrath, Jefferson City, Mo., is reported to be organizing a new company which will construct a concrete brick manufacturing plant here soon.

W. J. Hamlin Co., Macon, Ga., is manufacturing "Lamore Tile," a new building unit which is meeting with success in the building field.

Coleman & Reese, Scandia, Kan., are moving their Scandia tile and cement products plant equipment to their plant at Smith Center, having sold their Scandia property to W. P. Shivvers, who operates a sand and gravel plant at this place.

Anamosa Cement Products Co., Anamosa, Iowa, is soon to make cement cooling tanks along with their regular line of cement products.

Pottsville Building Block Co., Pottsville, Penn., is overhauling and equipping its plant for the manufacture of California stucco.

Shelton Concrete Products Co., Shelton, Wash., expects to add cement blocks and concrete brick to their list of manufactured cement products soon, it is said.

Bielderback & Castator Co., De Land, Fla., plant was destroyed by fire of undetermined origin on May 18, causing a loss estimated at $10,000.

F. J. Launceford, Brunswick, Ga., is contemplating opening a cement block plant at this place soon.

Eastwood Sand and Gravel Co., Grayville, Ind., is starting a cement products plant to produce concrete block, tile, brick, etc.

Superior Sewer Pipe Co., Greenville, S. C., has opened its new Columbia, S. C., plant with J. R. Nichols as superintendent and T. Keith Legare of Columbia, who is also vice-president of the company, as manager. This plant makes three types of machine made pipe, culvert, sanitary sewer and storm drain, by the McCracken process. The company has the contract to supply, for a period of six months, all the culvert pipe to be used by the South Carolina highway department.

Agricultural Limestone

Paris, Ky. County Agent P. R. Watlington reports that there are eight rock crushers at work in Bourbon county supplying the farmers of this district with agricultural limestone, and estimates that about 20,000 tons will be used this season.

Clarence, Mo. The special train used to promote the use of agricultural limestone and the raising of legumes for soil conditioning, furnished by the Burlington railroad in conjunction with the Missouri State Agricultural College, will visit Clarence on July 18, it was recently announced.

Lime

Kunze Lime Co., San Francisco, Calif., is building a new lime plant in South San Francisco on the site of the old American Barium Co. The plant will cost approximately $20,000 and will include three kilns, two to be built at once, with an estimate daily output of 10 tons. Charles Kunze is president of the company.

Gibsonburg Lime Products Co., Gibsonburg, Ohio, announces that its new modern plant is rapidly nearing completion.

Talc

United Talc and Crayon Co., Inc., Glendon, N. C., has installed a high side roller mill with air separation for grinding talc to fine mesh for the rubber, paper and textile trades. The machine was made by Raymond Bros. Impact Pulverizer Co., Chicago, Ill.

Silica Sand

Southern Silica Milling and Manufacturing Co., Columbia, S. C., has increased the capacity of its pits located in Lexington county.

Miscellaneous Rock Products

Union Phosphates, Ltd., is the new company said to have recently been organized with £100,000 capital to work the phosphate deposits in the vicinity of Malmesbury and Darling, South Africa.

Personals

Andrew O. Ritchie, 112 Clay Ave., Lexington, Ky., state representative of the Southwestern Portland Cement Co., recently announced his candidacy for the Republican nomination of lieutenant governor of Kentucky.

Raymond O. Elcock, Adams, Mass., assistant superintendent of the New England Lime Co. for the past four years, has resigned his position. His future plans have not been announced.

Harry C. Baker, Shelton, Wash., former manager of the Willey Concrete Co., has taken the position of manager for the Shelton Concrete Products Co.

Walter Hartung, Wauwatosa, Wis., one of the

Service And Equipment That Means Something

THE following letter is quoted to permit of detailed analysis. To be sure, it is rather complimentary but for the moment that is beside the point:

Sound engineering—dependable equipment

Repeat orders for conveyors and idlers

High grade belting giving extra long service

A plant recognized as being well designed and well equipped

Feb. 16, 1927

"We could not commend too highly the service rendered by the engineering department of the Robins Company, nor have we anything but the highest regard for the equipment furnished us and the excellent service this is giving us.

"Our first installation was made in 1920. Since then we have made additions and enlargements to our plants until today we have 5 different conveyors; two of these are 300 feet long, and three 70 feet long, a total of over 800 feet.

"The original equipment, including the 24" belt placed in service in 1920 is still in use, no replacements have been needed and the belt will no doubt be in service for several years more. We expect it will give us 10 years' service, at least, which will double our first expectations.

"We have received many flattering comments regarding our conveyors and their operation and as a just tribute to the Robins engineering service, we wish to acknowledge our indebtedness to them."

(Signed) J. H. Wagonner, Supt.
Boonville Sand Corporation
Boonville, N. Y.

Summing this up—the Boonville Sand Corporation now has a well designed plant, operating at very low cost.

Let Robins engineers help you with your problems. Let them install the conveyors, screens, bin-gates, etc., that will give you a dependable and flexible plant.

ROBINS CONVEYING BELT CO.
15 Park Row, New York
Chicago Pittsburgh Boston Los Angeles Philadelphia
Agents in other principal cities

Conveying and Elevating Equipment
Storage and Reclaiming Systems
Screening and Feeding Equipment

MATERIAL HANDLING
ROBINS
EQUIPMENT

owners of the F. Hartung & Son quarry, was hurt recently when a derrick bucket loaded with crushed stone let go and upset its contents into the quarry below.

E. Earl Glass, general manager of the Southern California Rock Co. of Los Angeles, Calif., spoke at the regular monthly meeting of the Building-Loan Securities Association of Southern California. Mr. Glass outlined the growth of the rock industry in California, from almost nothing 15 years ago to more than fifty plants at present, with an estimated output for 1927 of 14,000,000 tons.

C. C. Chesney, manager of the Pittsfield works, **W. R. Burrows**, associate manager of the incandescent lamp department, and **C. E. Eveleth**, manager of the Schenectady works, were elected vice-presidents of the General Electric Co., taking on responsibilities in the manufacturing department. F. C. Pratt, vice-president in charge of manufacturing, and H. F. T. Erben, assistant vice-president, of the manufacturing department, have retired. The officers of the company were re-elected at the meeting.

Walter E. Thau, manager of marine engineering, general engineering department, Westinghouse Electric and Manufacturing Co., has been appointed director of marine engineering, according to announcemet made by W. S. Rugg, vice-president of the Westinghouse company. Mr. Thau entered upon his new duties June 1 with headquarters in New York City.

Obituaries

Robert F. Clewell, Northampton, Pa., one of the first employes and chemist at the Northampton plant of the Atlas Portland Cement Co., died at his home on May 29.

Manufacturers

Falk Corp., Milwaukee, Wis., has opened a Chicago office at 122 South Michigan Ave., in charge of C. H. Thomas.

Dorr Co., New York, N. Y., have established a temporary laboratory in one of the buildings adjacent to the old mill at Westport, Conn., recently destroyed by fire. Semi-commercial scale tests are now being conducted as before the fire.

General Electric Co., Schenectady, N. Y., announces the following new appointments: W. S. Moody as consulting engineer for all transformer departments of the company and for all departments of the Pittsfield works; F. W. Peek, Jr., as engineer of the general transformer department to succeed Mr. Moody, and Chester W. Rice as assistant to E. W. Allen, vice-president in charge of engineering.

In conformity with the action of the board of directors an engineering council has been appointed. The council includes Messrs. E. W. Rice, Jr., honorary chairman (ex-officio); E. W. Allen, chairman; Elihu Thomson, A. C. Davis, W. R. Whitney, W. L. R. Emmet, C. C. Chesney and C. E. Eveleth.

Climax Engineering Co., Clinton, Iowa, announces the appointment of the James McGraw Co., Richmond, Va., as its sales agent in Richmond and vicinity.

Chain Belt Co., Milwaukee, Wis., has removed its Chicago office to room 1515, 222 West Adams Street.

Harnischfeger Sales Corp., Milwaukee, Wis., announces the following additions in the sales departments of its organization: R. S. Breyman, M. A. Germond, D. Graze, Deane S. Holt and J. C. Yetter.

Link-Belt Co., Chicago, Ill., announces the following changes in its organization: R. P. Shimmin has been appointed assistant to the chairman and the president, and will, hereafter, make his headquarters at 910 S. Michigan Ave., and Frank B. Caldwell has been appointed sales manager with headquarters at the Chicago plant office, 300 West Pershing road, and will have supervision over all sales activities in the western division.

Trade Literature

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Safety Devices. Bulletin listing and describing various safety devices for machines, workers, etc. First aid instructions. L. F. GRAMMES SONS, INC., Allentown, Penn.

Mining, Quarrying and Gravel Pit Machinery. Bulletin **266-D** covering crushers, screens, conveyors, sand tanks, etc. SMITH ENGINEERING WORKS, Milwaukee, Wis.

Apron Conveyors. Catalog No. **435** on wood and steel apron conveyors for handling bulk and package conveyors. Typical layouts, engineering data, specifications, etc. JEFFREY MANUFACTURING CO., Columbus, Ohio.

Shafts and Shaft Sinking. Bulletin No. **27** giving some typical illustrations and data on mine and quarry development projects engineered by the E. J. LONGYEAR CO., Minneapolis, Minn.

Gas Engine Driven Air Compressors. Catalog No. **801** on type "WN" Westinghouse-National gas engine driven air compressors. Construction details and design data, etc. NATIONAL BRAKE AND ELECTRIC CO., Milwaukee, Wis.

Celite for Concrete. Bulletin **325-B** giving information on the use of celite in concrete, including a discussion of the use of celite where the water-cement ratio is specified. Data of general interest on the subject of concrete construction with particular reference to the effect of workability on the uniformity, strength, water-tightness, permanence and appearance of the concrete. CELITE PRODUCTS CO., Los Angeles, Calif.

Grinding Mills. Broadside on conical mill and air classifier for coal, silica, limestone, etc., grinding. HARDINGE CO., York, Penn.

Ten Answers to Casting Problems. Bulletin showing reproductions of series of advertisements pertaining to improvements secured by addition of nickel to cast iron. INTERNATIONAL NICKEL CO., New York, N. Y.

Dust Collecting Systems. Bulletin No. **9**, a reprint from Rock Products, April 16, 1927, covering the new dust collecting system at the Ford Motor Co.'s cement plant. THE DUST RECOVERING AND CONVEYING CO., Cleveland, Ohio.

Rotary Screens. Broadside on rotary scalping, washing and sizing screens manufactured by the TRAYLOR ENGINEERING AND MANUFACTURING CO., Allentown, Penn.

P & H Groundhog. Bulletin **GH-1** on the new model 300 excavator, convertible to dragline, shovel, clamshell, crane and pile driver. Data on design, lifting capacity, working dimensions, etc. HARNISCHFEGER CORP., Milwaukee, Wis.

Rails and Track Accessories. Bulletin on standard and narrow gage industrial railway equipment. I. B. FOSTER CO., Chicago, Ill.

Shovel - Crane - Dragline. Bulletin on No. **501**, 1½-, 1¼- or 1-yd. capacity, gas or electric power shovel, convertible to crane or dragline. Specifications, data on design, etc. KOEHRING CO., Milwaukee, Wis.

Cable Drag Scraper. Catalog No. **95** on the Beaumont cable drag scraper for stripping, loading, storing, reclaiming sand, gravel, stone and other bulk materials. Working systems, specifications, data and design of equipment. R. H. BEAUMONT & CO., Philadelphia, Penn.

Elevators. Bulletin No. **680** illustrating and describing typical elevators for handling all classes of materials. Information on centrifugal discharge and continuous bucket types, construction data and specifications. LINK-BELT CO., Chicago, Ill.

G. E. Bulletins. GEA-722 on "Selsyns" for distant signaling, control and indication; **GEA-706** on station oil circuit breakers, types FK-230 and FHK-230; **GEA-101A** on station oil circuit breakers, types FK-, FKO-, FHK-, FHKO-236, 15,000 to 88,000v., 400 to 1200 amp.; **GEA-736** on induction motor panels, isolated types for motors with wound or squirrel-cage rotors.

General Electric Bulletins. GEA-6 on "500 series" squirrel cage motors of types KT (3-phase) and KQ (2-phase); **GEA-570** on hand starting compensators for squirrel cage induction motors; **GEA-530A** on type MT control equipment for d.c. series wound crane hoist motors; **GEA-250** on drum-type control equipment for two- or three-phase wound-rotor induction motors; **GEA-753** on shoe-type solenoid brakes for d.c. motors; **GEA-140** on hand starting compensators for squirrel cage motors; **GEA-416A** on automatic starting compensators for two- and three-phase squirrel cage induction motors; **GEA-751** on mine type suspensions.

Elevators and Conveyors. Book No. 575 on conveyors and elevators for miscellaneous purposes and various industries. LINK-BELT CO., Chicago, Ill.

Pioneering in Air Separation. An outline of the early investigations of A. W. Raymond and some of the applications of his discoveries in the rock products field. RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill.

Motor Truck Crawler. Bulletin No. **44** illustrating the Universal crane motor truck crawler. Data on design, construction, specifications, etc. UNIVERSAL CRANE CO., Cleveland, Ohio.

Osgood Shovels. Brochure illustrating types of Osgood shovels working at different projects. THE OSGOOD CO., Marion, Ohio.

Welding Society Establishes Miller Medal

AT the annual dinner of the American Welding Society, held in New York on April 28, President F. M. Farmer announced the donation of an award, the gift of Samuel Wylie Miller, to be presented by the society annually in appreciation of work of outstanding merit in advancing the art and science of welding. The award is a gold medal, which will be known as the Miller Medal.

S. W. Miller

In establishing this award, the details for the administration of which are not yet decided upon, Mr. Miller's object is to promote an appreciation of better welding and to encourage the study of those fundamentals which will raise quality.

S. W. Miller has been one of the outstanding figures in the advancement of welding ever since its commercial inception. He is a past president of the Amercan Welding Society, and a prominent and active member of the Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers and other scientific and engineering organizations. He has been long noted for his energetic insistance upon high quality and dependable workmanship and upon the development of welding by all processes along lines scientifically well founded. Mr. Miller is consulting engineer, Union Carbide and Carbon Research Laboratories, Inc.

Production of Asbestos in 1926

THE total quantity of asbestos sold or used by producers in the United States in 1926, was 1,358 short tons, valued at $134,731, according to figures compiled by the United States Bureau of Mines, Department of Commerce, from individual reports furnished by producers. These figures represent chrysotile asbestos mined in Arizona, and amphibole asbestos mined in Georgia and Maryland. The sales of chrysotile asbestos were much larger both in quantity and value than those of 1925, and the sales of amphibole asbestos showed a decrease in quantity but an increase in value.

Imports of unmanufactured asbestos for consumption amounted in 1926 to 257,621 short tons, valued at $8,142,505, and the exports were 1,104 short tons, valued at $85,922. Corresponding figures for 1925 were: imports, 230,520 tons, valued at $7,134,302; exports, 1,109 tons, valued at $70,846.